MODERN PLASTICS

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APRIL 1938
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Of General Interest

Technical Section

News and Features

Cover color this month TILERUST (Created by Textile Color Card Association)

Next Month

If you are a fisherman, or would like to be; if you have caught sailfish and swordfish, or would like to catch them; you'll want to read *Fish Story* in our May issue. A rare exposition of the ingenuity of modern man, this story reveals a few of the practices, lures and equipment in which plastics have contributed to the bewilderment of the "poor fish."

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MODERN PLASTICS
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PROGRESS THROUGH EXPANSION

The plastics industry is not static. Its growth, which is sure and steady, is premised upon increasing demands

EVEN BEFORE THE PARADE OF HORSELESS carriages began to astound our population around 1900, the Reynolds Spring Co. (then called the Jackson Spring Cushion Co.) made coiled springs to contribute what comfort there was in the seats and back cushions of carriages and buggies. When automobiles became the popular and accepted mode of personal transportation, better springs were demanded and Reynolds made them. With the advance of automobile production to America's Number One industry, the plant of the Reynolds Spring Co. at Jackson, Michigan, grew and prospered proportionately.

When automobile manufacturers became interested in plastics, it was natural for them to turn to the companies with whom they did business with requests for molded parts and in this way the plastics division of the company got its start. It was not a very auspicious start, however, and after a few years of unprofitable operations the business was offered for sale.

About this time an order for a sizable number of premiums came into the shop and as the run progressed, and more than ten million pieces were turned out, there was renewed enthusiasm in the Plastics Division and its offer of sale was withdrawn. From that day to this, the plant has grown with a steady increase in volume from year to year until there is hardly a car of any make that does not use molded parts of one sort or another from the presses in this plant. The spring business has grown, too, but the plastics division is likely to overtake it in volume in the future.

The automobile business, as every one knows, is one that demands tremendous production at certain seasons of the year. At other seasons, there is little demand at all for scheduled production. But those who supply any of the component parts and expect to continue to merit the business of these automobile manufacturers must be in a position to meet this seasonal demand by maintaining sufficient plant and staff to do so. To balance this demand, the Reynolds Spring Co. has built up a considerable volume of custom molding in other than automotive fields with the result that during the last few years of frantic automotive production, the plant at Jackson has been taxed to capacity and a program of plant expansion became essential.

It was decided, however, to extend the plant in a territory somewhat to the south and to the east which would be in a more central location to supply its clients other than automotive, and at Cambridge, Ohio, the plant of the Cambridge Pottery Company was purchased last year. The two-story building, which is 450 ft. long by 135 ft. wide, centered in a five-acre plot with plenty of room for additional buildings, is ideal for a molding plant. The four walls are almost entirely of glass and there isn't a dark spot in the place. Instead, the sun streams in from one side of the building or the other all day and almost perfect conditions for molding exist in every department.

The outside of the building will be resurfaced with brick to improve its appearance. Bright, cheerful offices are being built across the front with sound-deadening panels and ceilings. Huge fans are being installed at either end of the building to feed the offices with fresh air and remove dead air without creating a draft. Similar fans will be provided in the molding room to

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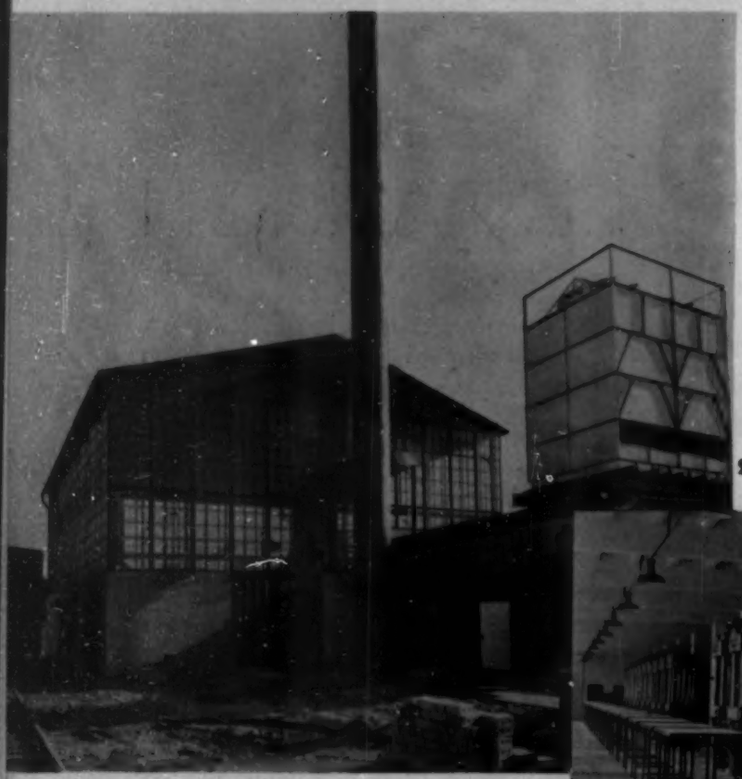

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eliminate excessive heat and ideal working conditions as well as molding conditions should result.

The interior of the plant is all white and since much of the molding is done with light colored urea and cellulose acetate compounds, they will be easy to keep clean. Rest and recreation rooms are being installed for workers and the men's rooms are equipped with showers.

Truck shipments are accomplished by direct contact with the shipping department and more than two thousand feet of privately owned railroad siding adjoins the plant for efficient receiving of materials and delivery of rail shipments without delay.

Twenty compression presses are installed and operating and a battery of injection presses is being set up as this goes to press. Additional equipment will be installed as rapidly as expansion warrants and space is provided for some two hundred presses in all.

Since the cost of the project will exceed three hundred thousand dollars, we asked Charles G. Munn, president, if he thought it wise to spend this amount of money in face of present conditions when the plant at Jackson is not running at capacity.

"I am thoroughly sold on the future of plastics," replied Mr. Munn, "and if our experience with these materials during the past few years is any indication of their

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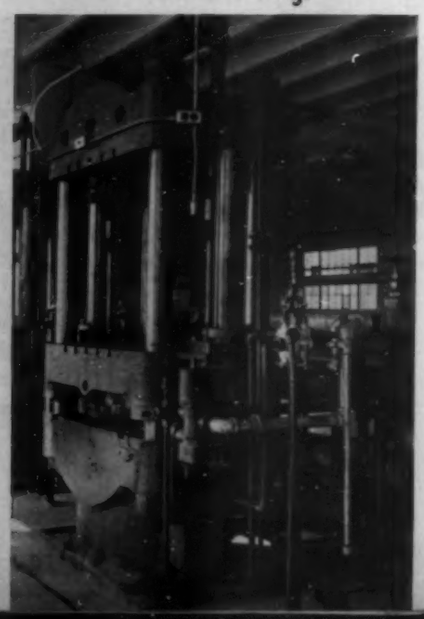

Two views of the new plant at Cambridge, Ohio, showing the main building (Fig. 1) and the glass-walled power room and water cooler (Fig. 2) atop the roof. Fig. 3 shows the first installation of compression presses one of which (Fig. 4) is molding urea tumblers for chain stores. Fig. 5 shows a close-up of one of the presses with manual controls at the right

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growth in the future, our plant at Cambridge will soon be completely equipped and running to capacity.

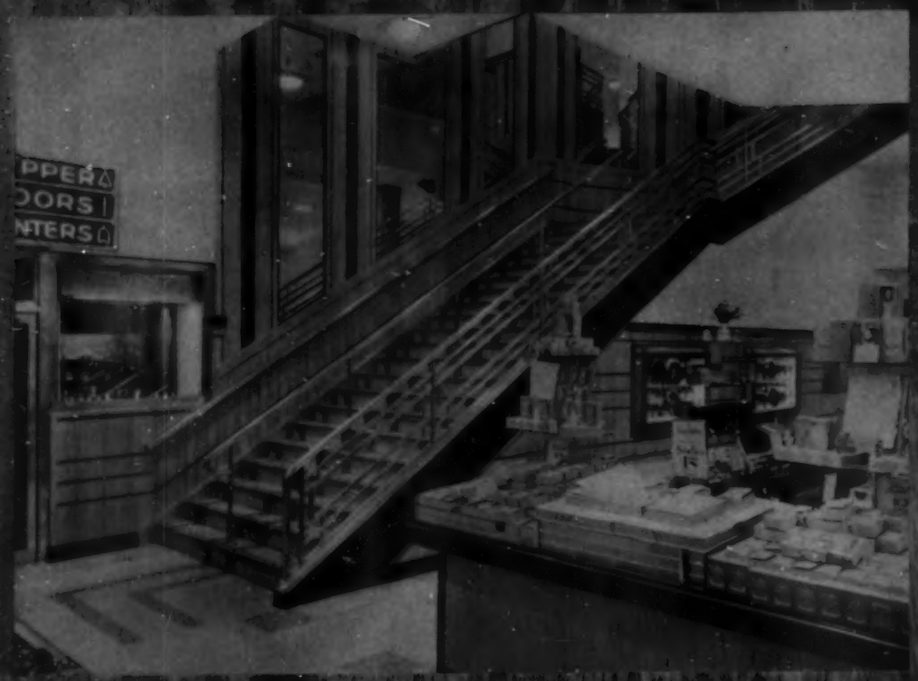
"As you doubtless know, our business is largely done with automobile manufacturers and they, more than any other industrial group, are investigating plastic materials for purposes where they have never yet been applied. The automotive engineer is a progressive citizen. Progress and improvement in transportation, both in efficiency of operation and in the outward appearance of his product, are the focal points of his every thought. New materials, whether plastics or metals, are given infinite consideration before specifications are made. Comparisons of weight, strength and finished cost of the part are carefully made and a few ounces in weight or a few pennies in cost frequently influence a choice if strength or ultimate service in the finished product is not sacrificed in the decision.

"The saving of a few pennies in the purchase of a part that is to be used on an item that will retail for a thousand dollars or more may seem absurd, but when the assembly contains from two to three thousand such parts, the influence on the eventual price becomes obvious. Likewise, the saving of a few ounces here and there, reflects itself in the eventual weight. With these considerations in mind, there are probably more automotive engineers experimenting with plastics than ever before and when you realize the enormous production required by this industry in anything like normal times, it is easy to see why plant expansion is absolutely necessary if we are to supply our share of the demand.

"So many new materials have been introduced during the last three or four years, and so many more will undoubtedly come through in the near future, that we have to step lively to keep up with them. Each new material costs us a lot of money before we get used to handling it. Each new application presents difficulties that we must overcome. But our plant in Cambridge, equipped as it will be with every modern facility, will enable us to give more prompt and complete service to our non-automotive accounts and will permit us to handle the ever-increasing volume of plastic (*Please turn to page 68*)

8

High and low pressure piping is arranged behind the presses at convenient level (Fig. 6) with a trench to remove any leakage from hydraulic rams. Valves and connections are already in place to accommodate another row of presses to be installed in the foreground. Shock absorbers (Fig. 7) are connected at either end of the pressure lines. Fig. 8 gives some idea of the size of the molding room in which expansion will be made as conditions require. The twenty presses now operating may be seen at the extreme rear



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FORMICA REALWOOD

Laminated Prima Vera inlaid with contrasting woods is used in F. W. Woolworth's new store (1) for pilasters framing carved mirrors at main stairway and valance in show case at foot of stairs; (2) sides of escalators and lower portion of walls; (3) sides of stairway from basement to first floor; and (4) front panels on lunch counter. Baseboards throughout the store are laminated to simulate black marble and stair stringers are of blue laminated as is the backboard of the lunch counter which is inlaid with murals depicting scenes of interest in New York City

REALWOOD—A LAMINATED PLASTIC

by EVE MAIN

This new laminated phenolic finds its first architectural application in the F. W. Woolworth store, Fifth Avenue, New York City

REALWOOD, THE NEWEST MEMBER OF THE laminated phenolic family, harmoniously combines the decorative charm of actual wood grain with the long lasting qualities of plastic material. Thin veneers of genuine wood, treated with a resinous binder and vulcanized into sheets, come through with a surface that is smoother, more uniform, and clearer—according to architects who have seen them—than it is possible to attain by applying varnish or lacquer to wood either by brush or spray. While the color and detail of the grain are not changed in the least by this process, the wood acquires a lasting finish that is wear-resisting and not affected by ordinary liquids. Made up in a special grade for use on table and counter tops, the material is safe from burns and scorches caused by cigarets.

The laminated sheets into which the wood is incorporated are but one-sixteenth of an inch thick and the maximum size of each sheet is three feet by eight feet. When used for wall paneling, column covering, or table and counter tops, the plastic sheet must be attached to a plywood back, which operation is accomplished on a veneer press. Once mounted, various panels or sections can be spliced together making an invisible joining and handled in much the same manner as any other piece of wood, except that all finishing has been done before the material is delivered for installation.

Not all woods can be processed in this way, but those available are sufficient to provide the architect and designer with a wide range of grains suitable for innumerable applications. Among them are flat cut, figured flat cut, quartered, half-round and claro Walnut; flat cut, ribbon and figured Prima Vera; flat cut and ribbon Mahogany; figured Red Gum; Lacewood; Macawood; Sapeli; plain and figured Teak; figured Aspen; Zebrawood; Satin wood; English Oak; African Cherry; gray Harewood; and Macassar Ebony. At the time of processing, any of these may be inlaid with metal or strips of contrasting wood according to the architect's specifications so that a minimum of fitting is required when the material is being set in place.

One of the first installations of this modern material for modern architecture appears in F. W. Woolworth Co.'s store, which occupies the first and second floors and basement of their new building on Fifth Avenue, New York City. This company was familiar with laminated plastics having found them unusually serviceable and effective for paneling and baseboards in many stores throughout the country. With this experience in mind, it was planned to use the material for similar purposes in the new store, in a color to match as nearly as possible the Prima Vera, a light, fine grained wood, specified for interior wood- (*Please turn to page 76*)

ROBERT ROBERTS PHOTO

CASA MANANA by BILLY ROSE

**The night club is his—
the story is our own**

The back drop in "The Glass-House" at Casa Manana (above) is fashioned from sheets of Plastacele, a cellulose acetate material, while the dancer (below) wears shoulder pieces and gauntlets of the same material. (Photos courtesy du Pont)

STAGE AND THEATRICAL DESIGNERS, CONstantly seeking new and spectacular effects, have always been avid experimenters with materials. As such, they happened upon plastics some years ago, finding them adaptable to many situations. Despite the more or less transient nature of such enterprises, the use of various plastics has grown rapidly as the demand for dramatic and unusual settings has been accentuated. This movement marks a new peak this year in the erection of a huge fixed backdrop installed at the Casa Manana, formerly the French Casino in New York City, recently opened by Billy Rose. Made of cellulose acetate sheeting, it contains more than eight thousand square feet and is forty feet high.

The transparent sheets were fastened together in vertical flutings, making a ribbed effect like hundreds of tall columns. The backdrop occupies three sides of the stage, one unit stretching across the back, with wings on each side. Two smaller side panels, carrying out the same pattern, complete the set, while the drop curtain is fashioned of the same material. The whole setting has been titled "The Glass-House" by its designers.

Rich hangings and brocades are hung behind the screen, with a thin voile hanging in front. Lights in many colors are then swept across the rippling surface, reflecting a brilliant sparkling pattern. The ensemble is an unusual one, providing a (*Please turn to page 76*)

WHITBY JET REPRODUCED

Recurring styles frequently find improved properties in modern materials

IN THE GRAND OLD DAYS WHEN "GRANDE dames" gathered to dance the minuet, the thing to wear was jet. During this Victorian era, large links of jet were carved for bulky necklaces and bracelets. Jet is a mineral in the next stage of petrifaction to coal which is commonly found at Whitby, England, from which place it derives its name.

Today the trend toward heavy costume jewelry is being revived and manufacturers turned to jet for inspiration. In their search for a material which would be more lasting and could be more easily handled and carved they turned naturally to the synthetic resins which they found durable, and not only suitable to be carved by hand but which carve into more unusual effects. The plastic jewelry is lighter too, not such a burden to wear.

Cast resin which can be sandblasted for a dull finish or polished to a high luster together with the advantages of easy fabrication and light weight proved to be a satisfactory material.

Modern fashions dictate slim, more attractive lines and the museum pieces which have been copied in plastics have been refined to meet these tastes. Black being popular for women's wear, and ecclesiastical design being currently modish, permitted these effective reproductions of Whitby jet pieces to be quickly accepted by the fastidious.

Exquisitely carved Gothic crosses with dull finish surmounted by polished floral designs with clips and brooches to match have been fashioned of black cast resin by the Alesite Company at one-eighth the cost of genuine jet. The intricate engravings and striking design of the jewelry well becomes the simple unrelieved black dresses which are predicted for Spring.

1618.—Earl and Countess of Somerset. (From a print of the period.)

Sandblasted Catalin, a cast phenolic resin, with highly polished contrasting relief sections has supplemented the Whitby jet of our grandmother's day. These currently popular designs are created by D. Lisner and Company

EIGHT MOLDED PARTS IN THIS SCALE ASSEMBLY

Indicate the trend of still larger business machine housings through departure from single mold technique which naturally limits the size and shape of the part that can be turned out

PHOTO COURTESY PLASKON CO.

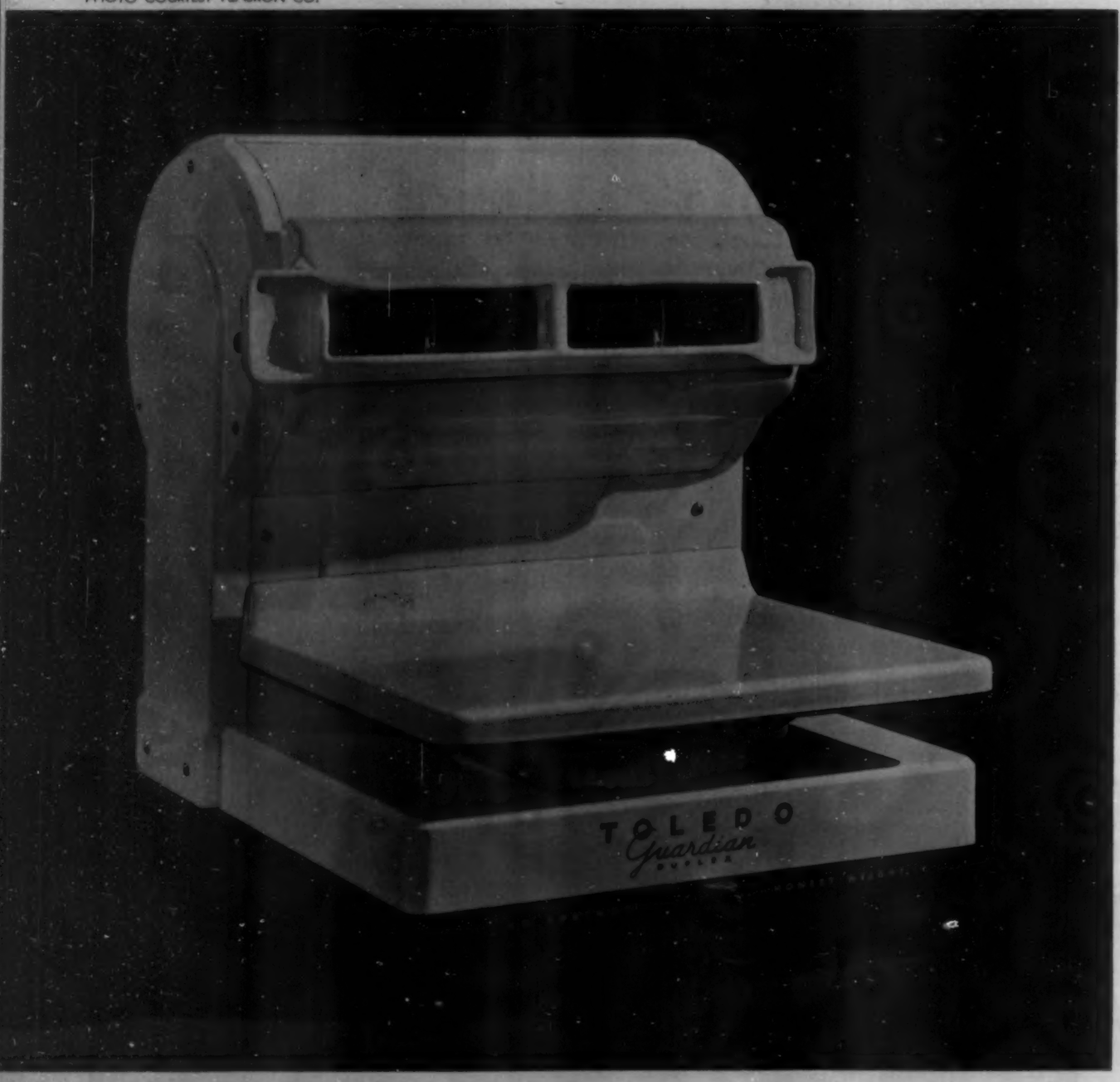


PHOTO COURTESY REYNOLDS MOLDED PLASTICS

These eight molded parts, containing 10 lbs., 2 oz. of urea plastics, indicate the elaborate engineering required to build seven molds with tolerances sufficiently close to allow perfect fit in the assembly

"LARGE MOLDINGS" WERE THE SUBJECT OF A luncheon at the Biltmore in New York in mid-March and several were on display around the room. They were discussed by G. R. Bennett, vice president and general manager of the Toledo Scale Company, A. E. Marshall, consulting engineer and former president of the American Institute of Chemical Engineers and A. F. Wakefield, of the F. W. Wakefield Brass Company. Included were such items as a printer housing, translucent reflectors, radio cabinets, meat grinders and a new butcher's and grocer's scale.

The discussion and the display provided a thought-inspiring milestone. The thought irresistibly arose: ten years ago, these very moldings on display had not been thought of nor attempted; are we now to believe the conservatives who tell us what cannot be done? What has happened in the past decade is that the limitations on molding have been steadily overcome. As long as that process continues, it is difficult to say what will be possible tomorrow and what will remain impossible.

Because of its radically different features, the most talked-of plastic job on display was a new scale. This scale is housed in plastic; but the housing is not a single casting; it is assembled. Its 8 sections contain 10 pounds, 2 ounces of plastic material, a high record for any single molded job. There are two models of this scale, one with the duplex lens device in a metal frame, the other without. The former has seven molded pieces, the latter one additional molded piece—the "window." Because the latter has all plastic sections, the figures given herein are the figures for this model.

These eight pieces represent seven molds. They include a base; a front plate; a back plate; two identical side plates; two semi-cylindrical sections for the head; and an oblong frame for the window. The pieces are screwed to the scale frame which is built up from an aluminum base. The mechanism hangs from this frame and not from the housing.

This new and different type of construction points two significant morals. For one thing, and this fact was the central theme of the luncheon discussion, if we mold machine housings in sections and assemble them, what housing cannot be made of plastic? Common sense, of course, sets certain (*Please turn to page 80*)

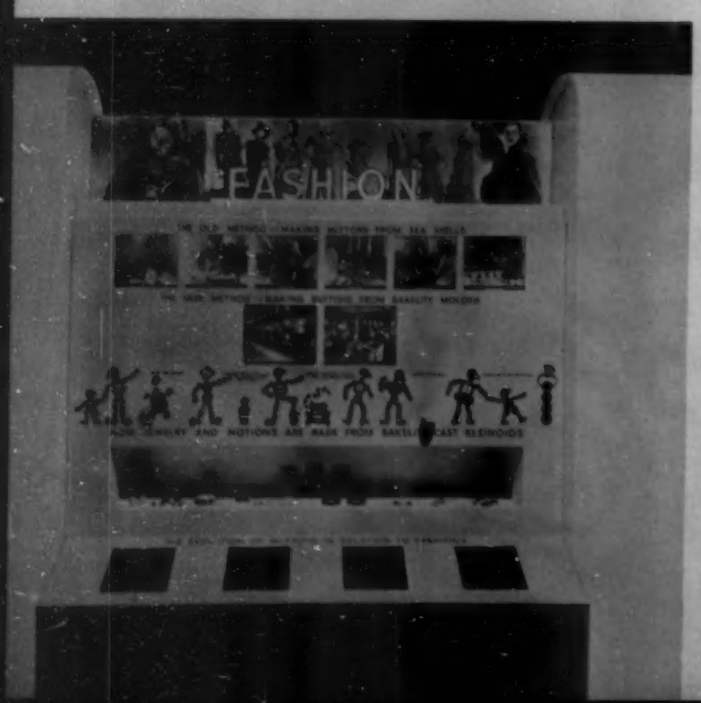
PLASTICS TRAVELCADE

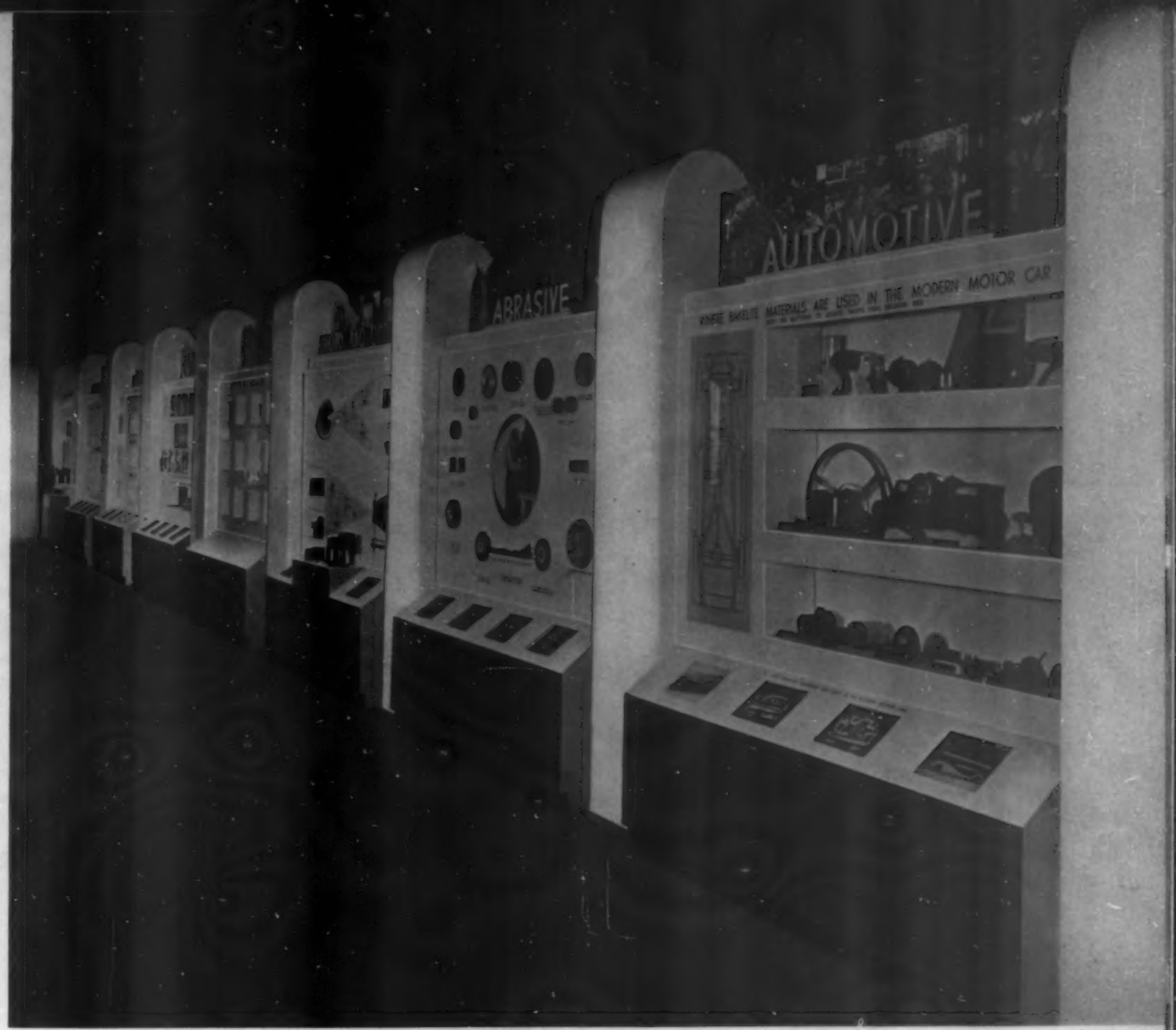
UNLIKE ANY PLASTICS EXHIBIT THAT HAS ever been shown, the Bakelite Travelcade, sponsored by the Bakelite Corporation, brings to the public the first real story of modern plastics with concrete examples which everyone can understand. It is not a story in words, but an amazing exposition which tells its own story about these fascinating new materials which everyone wants to see and wants to know more about.

Conceived as an educational project rather than as an advertising presentation, it is built around a theme which plays a vital part in the lives of millions of citizens in this country today. It describes the genesis of the organic plastics industry; the interrelationship between plastics and other industries; the stimulation to commerce as these new materials of the chemical laboratory find their way into thousands of places in the home, the factory, the office, the arts.

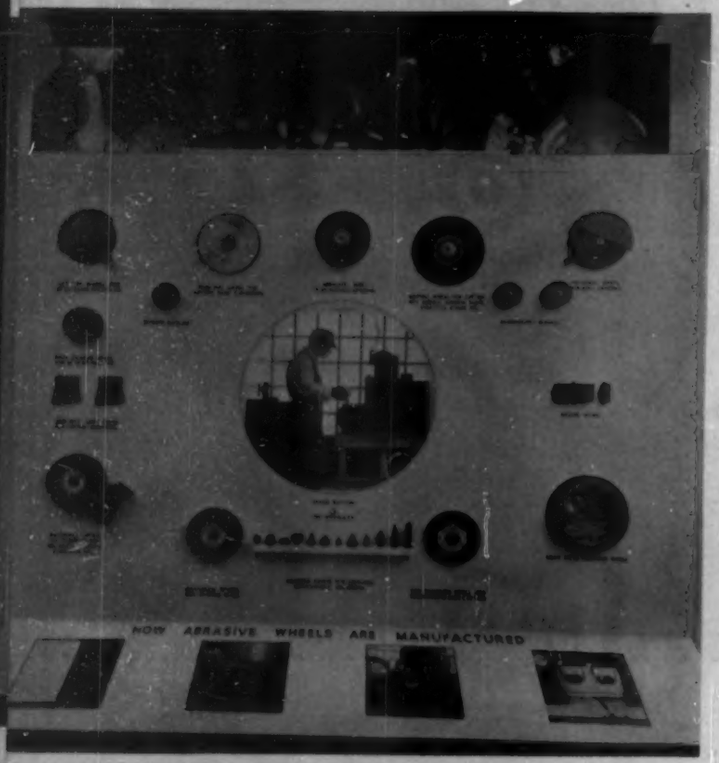
Among the twenty-seven booths are those which indicate the uses of plastics in aviation, household appliances, building, business machines, abrasives, house furnishings, photography and optics, packaging, radio, machinery, fashions, automobiles, paints and varnishes, communications, amusements, music, and even to the part they contribute to the health of humanity.

Animated demonstrations reveal some of the unusual properties of plastic materials, as the public is conducted on a brief tour past each individual booth.





Each of the 27 booths tells a lively, interesting, well-illustrated story with actual molded, laminated, or cast plastic parts to demonstrate the materials in actual applications. It is probably the largest assemblage of diversified plastic products ever exhibited outside the trade



In addition, a new sound film entitled "The Fourth Kingdom," is shown which pictures the story of plastic materials. Lowell Thomas describes how chemical research has taken the three kingdoms, Vegetable, Mineral, and Animal, and created a fourth kingdom whose boundaries are unlimited.

Launched last month at the Museum of Science and Industry, in New York, Travelcade is touring New Jersey (See schedule) during April and May after which it will be installed at the Franklin Institute in Philadelphia, Penna., and thence to the New York World's Fair. Consult the schedule. If you are interested in plastics you will not want to miss it.

TRAVELCADE SCHEDULE

Week of April 4—University of Newark, Newark, New Jersey, Sponsored by Delta Sigma Pi

Week of April 11—Y.W.C.A., Jersey City, New Jersey

Week of April 18—Somerset High School, North Plainfield, New Jersey

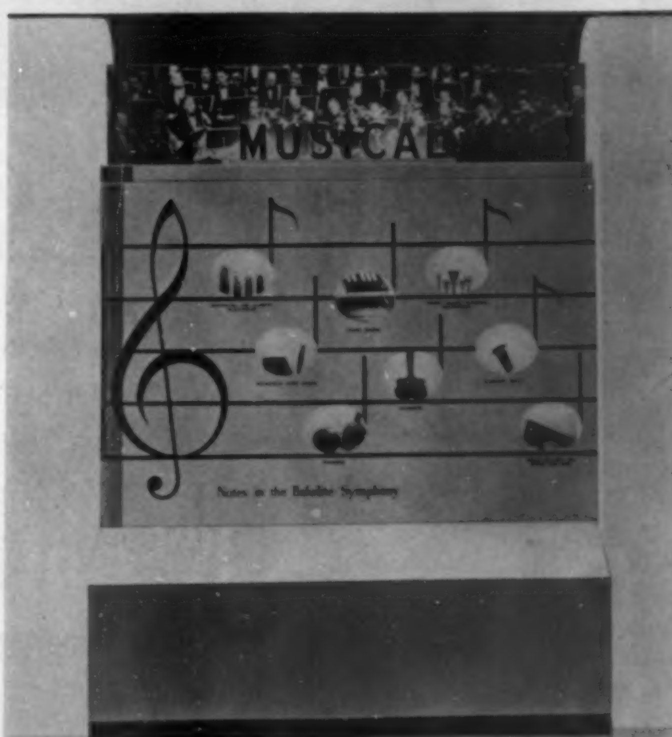
Week of April 25—Lafayette School, Bound Brook, New Jersey

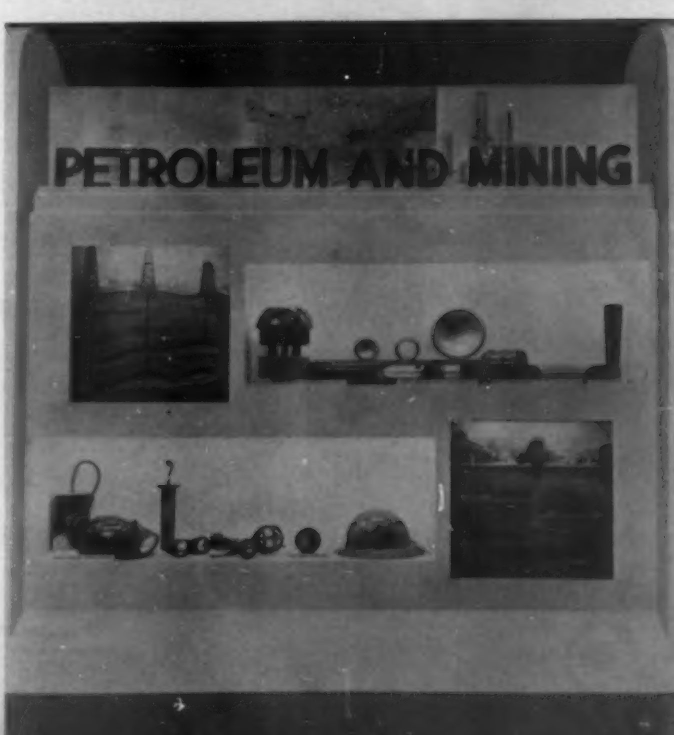
Week of May 2—Y.M.C.A. Elizabeth, New Jersey

Week of May 9—Y.M.C.A., Bayonne, New Jersey

Week of May 23—Y.M.C.A., Hackensack, New Jersey

PLASTICS TRAVELCADE





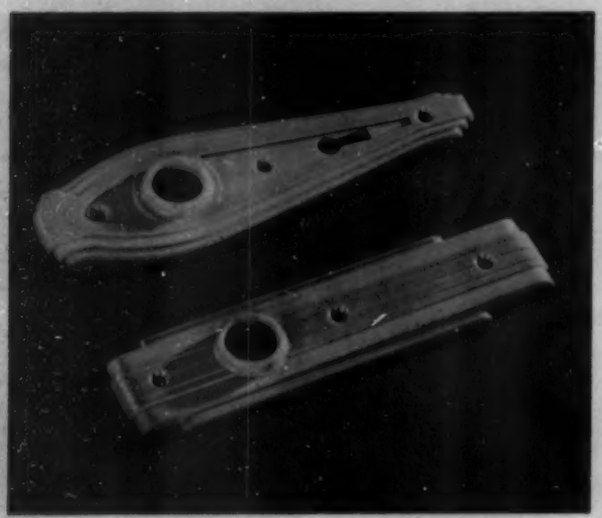
PLASKON

MOLDED COLOR

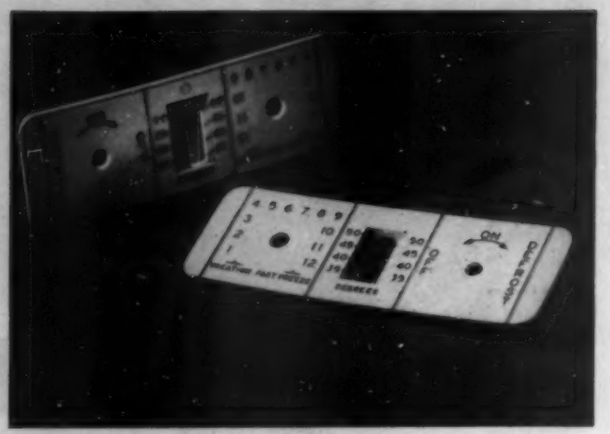
SALUTE TO REYNOLDS

This month Reynolds Molded Plastics start production in their new and modern Cambridge, Ohio plant, a plant that typifies the progress being made in the ever-growing molding industry. And Plaskon presents three moldings that typify the range and fine quality of work done by both of the Reynolds plants.

First is a pair of door escutcheon plates molded for National Brass Company, well-designed with contrasting dull and shiny bands and molded of



green, blue and ivory Plaskon. Next is shown a cold control plate of white Plaskon molded for Kelvinator with debossed wiped-in numerals and lettering (note rear-lighted view showing translucency of the material). Both are excellent examples of the use of Plaskon to obtain accurately formed parts that never rust or corrode, with a permanent color and lustre that never chips or



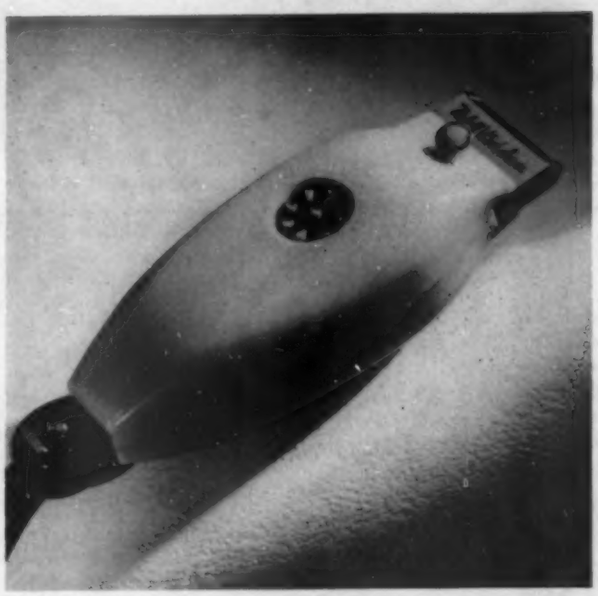
peels or discolors with age.

Third Reynolds molding is a new Plaskon radio cabinet for Wilcox-Gay Corporation. A very unusual shape—one of the most interesting efforts to get away from conventional forms—and a range of soft Plaskon pastel colors combine to make a highly decorative cabinet that needs no costly mold-decoration to give it consumer appeal. Speaker-grille is on top, and dial is molded in harmonizing colors.

APRIL 1938

NICHOLL SHAVER

For a bathroom appliance like an electric shaver, Ivory Plaskon is the most logical color, because ivory is America's favorite bathroom color. Furthermore, women buy a large portion of the electric shavers for the males these days, and they like



colors that harmonize. And men like a shaver that looks clean and sanitary—and stays that way.

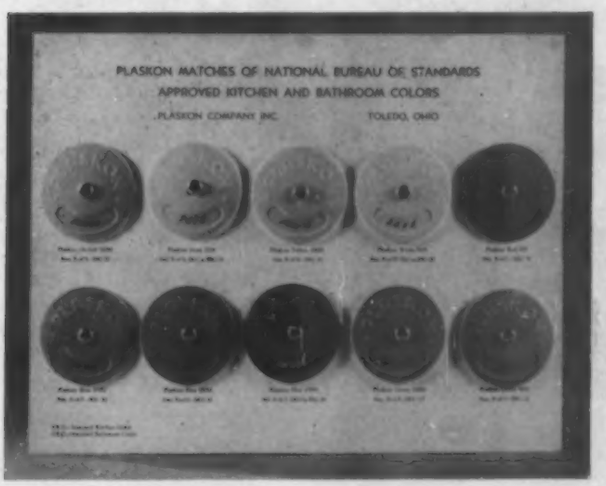
Which indicates that Nicholl, Inc. made a good color choice in picking Ivory Plaskon for their new Velvet Shaver. Plaskon's depth of color, its dielectric strength, its permanent lustre and resistance to perspiration, heat, wear and corrosion make it an ideal material for electric shavers and, for that matter, electric appliance cases and parts of almost every type.

Windman Bros. mold the Nicholl Shaver case.

BATHROOM—KITCHEN COLORS

Best-news-of-the-year for house-furnishing manufacturers is the recent standardization of bathroom and kitchen colors by the Bureau of Standards and the National Retail Dry Goods Association. Ten colors—instead of hundreds—will now be used by manufacturers of bathroom and kitchen appliances so that a red-trimmed stove will match a red-trimmed whipper or tea kettle instead of being another shade of red.

What's more, the colors are really good. Soft blues and greens, gay red, warm yellows and ivories—all are scientifically planned to make kitchens and baths more pleasing and livable.



Plaskon—being a member of the N.R.D.G.A. group that decided on the colors—has matched the standards in molded color discs as shown in the photo above. Write for a set today on your company letterhead, so that you can specify by number on your molding orders. No charge, of course.

PLASKON COMPANY
INCORPORATED
2121 SYLVAN AVENUE, TOLEDO, OHIO
CANADIAN AGENT: CANADIAN INDUSTRIES LIMITED, MONTREAL, P.Q.

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1. Benson & Hedges have chosen a pebble grain black fabric inlay with a gold-plated band to decorate their new plastic cigaret box. Molded of Durez by the Gorham Co.

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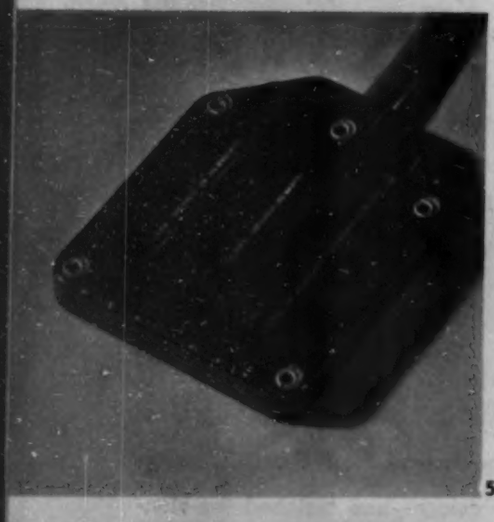
2. Lionel Corp. now molds the top of its toy coal cars of Bakelite with a dull finish which actually looks like miniature pieces of coal. A beryllium copper mold is used

3. Ful-Vue mirror which has been developed by the American Optical Co. has a brown molded plastic base, topped on each side with ribbed die-cast pieces in chrome finish. The mirrors are heavy ¼ in. pink glass and their angle is adjustable to suit various requirements



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4. Iodostick is iodine in concentrated form which dissolves quickly in blood or water. It is packaged in a red Bakelite container about the size of a lipstick case

5. Hushatone permits a bedridden patient to listen to the radio without disturbing anyone in the room. This pillow speaker is more convenient than head phones and is attached by a long cord to the radio receiver. Molded of Durez by Ackerman Rubber & Plastic Molding Co.

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6. Micro-Switch will handle inductive loads such as motors, solenoids, and relays—making and breaking circuits. Its sturdy tamper-proof housing of Bakelite and Plaskon protects internal parts from dust or oil and assures low electrical resistance

7. Evered and Co., Ltd., Smethwick, England, molded this modern door handle which is mottled white with a black base. Molded heads cover the attaching screws

8. Ingenuity in design and molding combine to make possible the new Curlocomb, a product of Clairol, Inc. Injection molded by Erie Resistor Corp., the device consists of a large comb and a smaller one, molded of white Tenite. The use of this plastic makes it non-absorbent to lotion and shampoo preparations

9. Of all things—here's an electrical tooth-brush called Motodent which has a smart Beetle housing developed by the Dalmo Mfg. Co.

10. The Powers Paper Co. package their stationery so it can be easily seen although protected from dust and handling with a transparent flexible Fibestos case. It is attractively tied with ribbon

11. The U. S. Weather Bureau uses successive layers of Protectoid, a cellulose acetate sheet material, over weather maps to chart varying air currents at different altitudes for aviators and gliders. As many as ten layers have been used without loss of visibility of data on the lowest sheet

12. Illumination of this Kelvinator display sign is provided by a tubular lamp concealed in the molded urea plastic base. This provides translucency to accentuate the pattern of the molded part which shields the direct rays of the light from the observer's eyes. Molded of many light colors of Plaskon for Neon Products, Inc., by General Electric Co.

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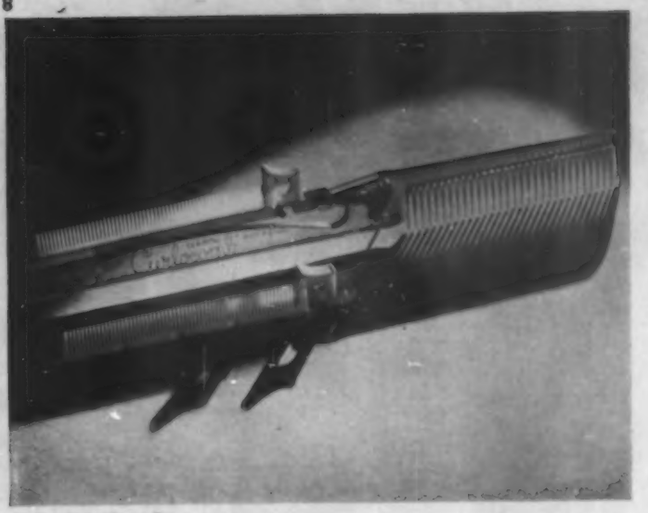

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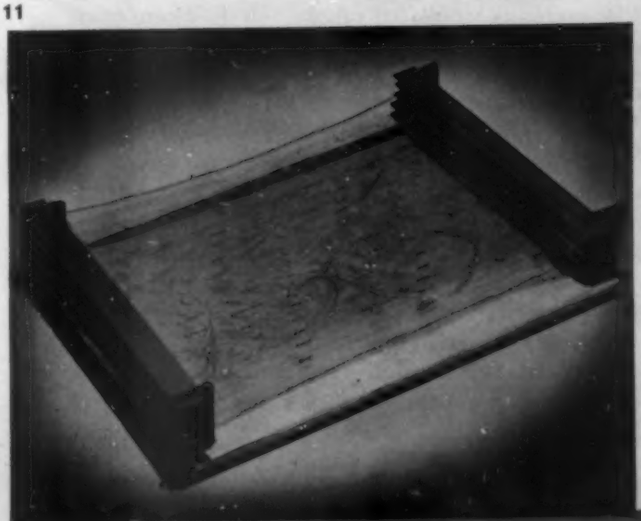


12

IN REVIEW

GAE FOSTER GIRLS AT ROXY THEATRE, NEW YORK

The new Argus Model "C" Candid Camera has a precision molded case of Durez, metal trimmed and leatherette faced

CANDID, INDEED

Precision molding contributes to popular price as well as to popular appeal

THE NATIONAL INTEREST IN MINIATURE photography through the use of candid cameras is reflected in this enlarged replica which was used as a scenic background by the Gae Foster Girls at New York's famous Roxy Theatre recently. It was inspired by the new Argus Model "C," the latest contribution of International Research Corp. to photography.

This is a miniature type 35 mm. camera of entirely new design. Its beautifully proportioned and perfectly balanced case is of molded phenolic plastic with metal trim and a rich black morocco leatherette facing. The inner case of molded plastic insures perfect working precision with tough resilient strength and sturdiness while avoiding excessive weight. It is of handy compact size measuring $5\frac{1}{8}$ in. long, $2\frac{3}{4}$ in. high and 2 in. thick, weighing only 24 ounces.

The use of the Cintar *f*3.5 lens necessitates accurate focusing and to meet this problem the camera is equipped with a built-in range finder. The view finder and range finder eyepieces are placed side by side in a convenient position at the back of the camera. The optical view finder has a perfect infinity focus. The range finder is of the split image sextant type and is built into the case body, making it an integral part of the camera where it is free from knocks and danger of breakage. Focusing the range finder is accomplished by a conveniently located knurled control knob. The image appears in full size with exceptional sharpness and distinction.

The film is advanced by a large and easily accessible winding knob and exposures recorded by an automatic counter. Any type of 35 mm. double perforated film may be used in either 36 exposure daylight loading cartridges or the new Agfa-Argus 18 exposure spool. This camera is adaptable to all types of color work.

The Cintar *f*3.5 50 mm. lens is standard equipment. This new triple anastigmat (*Please turn to page 80*)

STOCK MOLDS

SHEET FIFTY-THREE

Knobs and handles of different sizes and shapes are available in a wide variety of colors from stock molds. Please use company letterhead when writing for samples

---

565. Beer faucet or gear shift ball with threaded opening 5/8 in. diameter

566. Ball knob with threaded opening 5/16 in. diameter

567. Same as 565, with 3/8 in. opening

568. "Streamlined" ball with tapped thread 3/8 in. diameter

569. Navy key knob, 8-32 stud projects 7/32 inches

570. "Streamlined" ball with threaded opening 1/8 in. diameter

571. Knob with hole for 1/4 in. shaft. 8-32 set screw in side

572. Radio control knob with pointer. Hole for 1/4 in. shaft. 8-32 set screw in side

573. Decorated control knob with pointer. Hole for 1/4 in. shaft. 8-32 set screw in side. Diameter 7/8 in., 5/16 in. high

574. Decorated knob with hole for 1/4 in. shaft. 5/8 in. diameter, 1/2 in. high

575. Radio control knob with knurled sides and pointer. 11/16 in. diameter

576. Decorated knob same design as 574. 13/16 in. diameter and 1/2 in. high

577. Knob with hole for 1/4 in. shaft. 13/16 in. diameter

578. Hexagonal dome top knob. Hole for 1/4 in. shaft. 5/8 in. inside diameter

579. Hexagonal round-top knob, 5/8 in. inside diameter

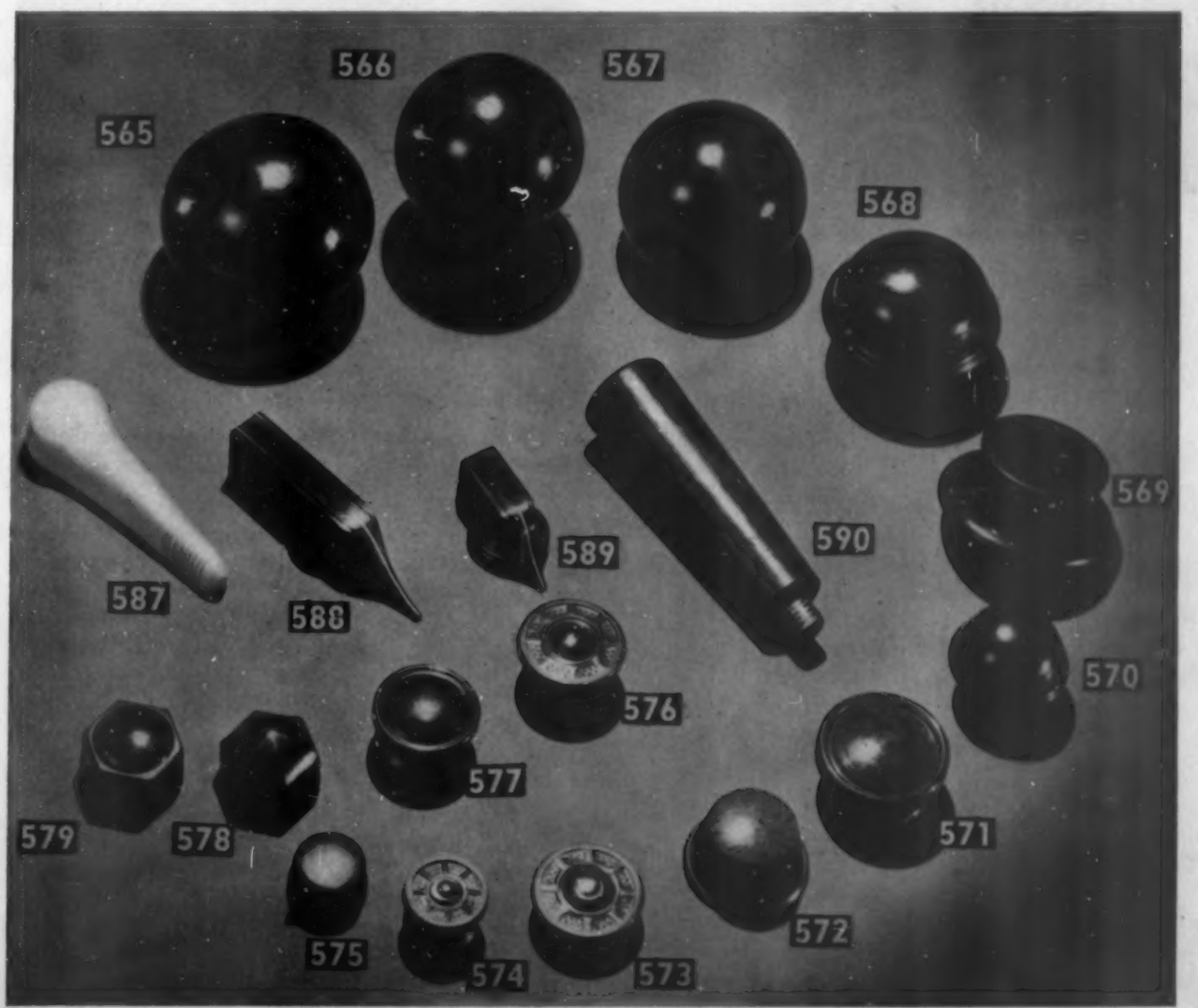
587. Handle with opening 1/4 in. diameter. 2 1/2 in. long

588. "Streamlined" bar knob with contrasting directional line. 2 1/4 in. long

589. "Streamlined" bar knob with contrasting directional line, 1 1/4 in. long

590. Tapering handle 7/8 in. in diameter at top. 2 5/8 in. long, 5/16 in. stud

Address all inquiries to Stock Mold Dept., Modern Plastics, 425 Fourth Avenue, New York, N. Y.



STOCK MOLDS

SHEET FIFTY-FOUR

Molded urea lighting reflectors of the types illustrated may be purchased directly from the molder who will gladly quote on any quantity you require. Please specify both item and sheet number when writing

---

628. 16 in. bowl reflector with plain surface and 3 holes for hanger chains

629. Individual bulb shade, 5 1/2 in. diameter with 1 7/16 in. opening at base

630. Much the same shape as No. 628 but with decorated rim, 12 in. diameter

631. 4 in. individual shade decorated in bas-relief conventional pattern

632. 5 1/2 in. bowl reflector. Has thin section at bottom which forms a pattern when lighted

633. 12 in. bowl type reflector of standard design. Decorated center and rim

All inquiries should be addressed to Stock Mold Department, Modern Plastics, 425 Fourth Ave., New York City

PERMANENCE OF PLASTICS*

by GORDON M. KLINE
National Bureau of Standards

THE USE OF SUPERLATIVES IN DESCRIBING NEW products which present unusual advantages for many applications is natural on the part of laboratories which have devoted months of enthusiastic efforts to their development. However, the plastics industry is graduating from the period in which such terms as "unbreakable," "permanent," "corrosionproof," and "lightfast" are acceptable as sufficiently descriptive of the properties of the materials which have been synthesized. The designer, engineer, and ultimate consumer want definite facts regarding the behavior of plastics under various service conditions. The experience of the manufacturers of plastic-bonded glass for automobile windshields will perhaps illustrate the difficulties which arise from the loose use of mere words to describe the characteristics of a product. At the time of their introduction on the market, these windshields were commonly known as "unbreakable" and "non-shatterable." In fact, it is not necessary to go further back into advertising literature than 1937 to find an optimistic publicity man portraying a hammer poised over an automobile windshield or over the new transparent resin which is being used for airplane windshields. The disastrous results which follow the performance of this experiment led in the case of the automobile windshield material to the employment of the words "non-scatterable" and "safety" as typifying its virtues. Injuries sustained from glass which did scatter from these windshields, particularly in cold weather, and the horrible picture which the widely circulated article entitled "And Sudden Death" gives of this safe windshield severing an individual's neck promoted a further change in the designation of this product to "laminated" glass. The other terms were somewhat misleading attempts to incorporate in the name of the product reference to those characteristics in which it is superior to ordinary glass. The impact resistance and scattering of glass particles are now carefully controlled by standard methods of test written into state and government specifications for these plastic-bonded windshields.

An example of the extreme claims which are some times made for new materials instead of the submission of data obtained by recognized methods of measurement is provided by a circular describing a new base for a protective coating. The circular states that the coating is "oil proof as well as water-tight and air-tight, *and therefore the elements which cause corrosion on any surfaces may not penetrate to said surfaces in any manner whatsoever.*" At the time this product came to our attention, we were investigating the permeability to moisture of various synthetic finishes for aircraft, since it is well known that the presence of moisture is necessary for the common types of metal corrosion. A test on films of this "impenetrable" coating material showed that they had a greater permeability to moisture than many prepared from the commonly used varnishes containing phenol-formaldehyde and glyceryl-phthalate resins. It is interesting to note that this product was particularly recommended for protecting among other things office buildings, bridges, and farmers against corrosion and wear.

The foregoing examples of the failure of adjectives to take the place of data obtained by recognized tests should emphasize the importance of the work which the recently organized Plastics Committee of this Society is undertaking. In no other group of properties is there such a need for standard methods of test as in the permanence class. The Plastics Properties Chart published in the October 1937 issue of MODERN PLASTICS provides evidence of the vague terms which are at present the only means of comparing the effect of various deteriorating agents on the different types of plastics. Included among the terms used to describe the effect of chemical reagents on the materials are "none," "slight," "resistant," and "deteriorates," all of which are subject to various interpretations. It is hoped that in the near future it may be possible to use numerical values to express the durability of plastics.

Before discussing some of the proposed methods for testing the resistance of plastics to deterioration, it may be of interest to consider two factors which have an important bearing on their permanency. Composition and molding conditions are very closely related to the stability of the finished product.

* Paper presented as part of a symposium on plastics at the Rochester meeting of the American Society for Testing Materials on March 9, 1938. Publication approved by the Director of the National Bureau of Standards of the U. S. Department of Commerce

Effect of composition on permanence of plastics

The class of resins which undergo further chemical reaction in the mold to yield a product which is no longer fusible or soluble, i.e., the thermosetting resins, are inherently more stable dimensionally than the thermoplastic materials which alternately soften when heated and harden when cooled. The phenol-formaldehyde and urea-formaldehyde resins are the leading industrial examples of the thermosetting resins. Because these resins are in an incompletely reacted stage as they are supplied to the molder, there is the possibility of further reaction during their shelf life. In paints this phenomenon causes "livering" or gelling of the mass. In a study of phenolic denture blanks Schoonover and Sweeney[1] observed that after several months' storage the resin would set too quickly to permit proper shaping, or the final product would be discolored and unduly brittle. It is conceivable that in the case of molding powders a similar tendency to undergo further reaction before fabrication might lead to strains in the molded article because of insufficient flow in the die or to brittleness because of overcuring. In any event, the reaction which takes place very rapidly in the mold may continue at a much slower rate during the service life of the product. In most instances this is probably negligible, but where exposure at an elevated temperature is concerned, it undoubtedly is a predominant factor in the ultimate failure of the piece.

The properties of the thermoplastic materials are subject to considerable variation with temperature. Cellulose nitrate plastic and resins containing chlorine groups in particular undergo chemical deterioration at elevated temperatures and in sunlight. The cellulose and protein plastics usually contain plasticizers and the gradual loss of these chemicals by evaporation or the leaching action of rain may lead to shrinkage and embrittlement. Acids and alkalies are utilized either as essential ingredients or catalysts in the manufacture of many of the thermoplastic materials, and residual quantities of these chemicals may result in rapid breakdown of the plastic when exposed to heat, light, or high relative humidity. Chemical composition is of particular importance in the resistance of these materials to deterioration by industrial solvents and corrosive fumes. Thus, oxygen-containing compounds, such as the cellulose derivatives, are subject to attack by acids and alkalies but are little affected by hydrocarbon solvents, whereas for the hydrocarbon types of plastics, such as styrene resin and the bituminous cold-molded materials, the opposite is true.

Effect of molding conditions on permanence of plastics

Proper molding conditions are equally vital to the development of maximum durability of plastics. The thermosetting materials have a state of "cure" or reaction which produces optimum mechanical strength and resistance to deterioration. Heating in the mold for too short a time or at too low a temperature will yield an undercured product which has unsatisfactory strength, electrical properties, and dimensional stability. Prolonging the heating or raising the temperature above the recommended maximum may result in a brittle product. In practice, the tendency has been to speed up the rate of cure of the resinous composition in order to decrease piece costs. This, of course, narrows still further the interval during which a satisfactorily cured product can be obtained. Unfortunately, it is impossible to detect visually any but the most flagrant instances of improper curing and many molded parts have been sold which inevitably failed within a few months of service. Small wonder, then, that one hears so many tales of the "unbreakable" tumblers which the baby demolished.

When the U. S. Navy Department became interested in phenolic plastics, it found that the usual industrial molding methods would not meet the demand for high quality and uniformity of parts for use on naval vessels. These parts serve as complete inclosures for electrical fittings, gages, meters, clocks and similar equipment, replacing brass or aluminum covers heretofore employed. Compared with metal construction the molded boxes had the potential advantages of greater dielectric strength, elimination of grounds, resistance to the corrosive action of sea air, acid fumes and oil, and no necessity of refinishing. However, many of these characteristics as well as the requisite physical strength are lacking in an improperly compounded or cured piece. Cassey[2] has reviewed the situation as it existed when the Navy entered this field. Without questioning the sincerity of the molder, he points out that the wrong material may be inadvertently employed, the molding pressure or temperature may get out of control at intervals, the mold may heat unevenly, the workman may speed up on the time of cure or he may slip up on the amount of material he is using, the breathing of the mold may not be quite right, the material may not flow properly, or the piece may be poorly designed for molding. For these and other reasons the superficial inspection accorded most commercial moldings had to be replaced by rigid performance specifications, particularly with regard to the degree of cure. Thus, although the author states that "possibly no equipment problem involved in the construction of naval vessels in recent years had demanded the attention given to the application of phenol resinoids to the field of electrical installations," the benefits of the inherent stability of these materials when molded under correct conditions were achieved by resort to exacting tests of the finished pieces. It is the aim of the Plastics Committee of the A.S.T.M. to develop test methods covering all the various types of plastics which will enable any purchaser to assure himself that the plastic will have the full measure of permanence of which it is inherently capable.

Resistance of plastics to various agents

Plastics are usually classified according to their chemical types, e.g., synthetic resins, natural resins, cellulose derivatives and protein compounds. Another

[1] I. C. Schoonover and W. T. Sweeney, "Some defects in the phenol-formaldehyde and vinyl resins used for denture purposes." Paper presented at the Annual Meeting of the American Dental Association, Atlantic City, N. J., July 13, 1937

[2] T. E. Cassey, "The Problem of the Phenol Resinoids," J. Am. Soc. Naval Engineers, 49, 65–76 (Feb. 1937)

classification is based on the processing required in forming them, for example, thermoplastic, thermosetting, stoving, seasoning and water-setting. Neither of these methods is of primary interest to the consumer who, as Owens[3] emphasizes, is concerned to a greater extent with what a material does rather than what it is or how it is made. Electrical insulating materials have been graded by both British and German Specifications on the basis of their resistance to deformation when heated. However, there are many other potential causes of deterioration such as light, water and chemical reagents, which are of equal or greater importance under many conditions. Some of the methods used in determining the effect of these agencies on plastics and typical results obtained are reviewed in the following pages.

1. Light

The ultraviolet rays of sunlight have a deleterious effect on many types of plastics and particularly on some of the coloring materials used in these compositions. The fading of the dyes may in some instances be caused by chemical breakdown of the plastic induced by the light rays. The only reliable method of determining the resistance of a plastic to sunlight is outdoor exposure and to obtain comparable results in successive tests these must be made during the same months of the year. The maximum effects are obtained in Washington during the months from May to September, inclusive. Exposure tests in the vicinity of Miami, Florida, represent a more severe test and are specified by the Army Air Corps for testing transparent plastics for aircraft windshields.

A new development in exposure testing was recently described by Gardner[4] and consists of a rotating rack which keeps the specimens perpendicular to the sun's rays at all periods of the day. It is stated that fading, chalking and checking of fin- (*Please turn to page 82*)

[3] W. D. Owens, "The Classification of Industrial Plastics," British Plastics 7, 552–4 (May 1936).
[4] H. A. Gardner, "Sun-Spray Rapid Test Rack," Nat'l Paint, Varnish and Lacquer Assn. Cir. 534, pages 177–93 (June 1937).

FIGURE 1.—CONDITION OF PLASTICS AFTER SIX MONTHS EXPOSURE OUT-OF-DOORS AS FLAT SHEETS. THE LOWER FOURTH OF EACH SPECIMEN WAS SHIELDED FROM DIRECT SUNLIGHT

Identification number	Material	Sample
10	Ethylcellulose	G4
11	Do	G3
12	Cellulose acetate	A4
13	Do	A6
14	Do	A5
15	Methyl methacrylate resin	K11
16	Do	K12
17	Do	K13
18	Do	K15

FIGURE 2.—CONDITION OF PLASTICS AFTER EIGHT MONTHS EXPOSURE OUT-OF-DOORS IN CURVED FRAMES. THE LOWER HALF OF EACH SPECIMEN WAS SHIELDED FROM DIRECT SUNLIGHT

Identification number	Material	Sample
1	Cellulose acetate	B3
2	Do	D1
3	Methyl methacrylate resin	K6
4	Vinyl acetal resin	N1
5	Ethyl cellulose	G1

1

2

MOLDS FOR PHENOL RESINOIDS

by T. E. CASSEY*

Sixth installment continued from our March issue and reprinted by permission from August 1937 issue Journal of The American Society of Naval Engineers

Extrusion (transfer) molds

The extrusion type mold, also referred to as the "transfer molding method," consists essentially of a cavity into which the molding composition is forced while in a plastic condition, by the "extrusion" or "transfer pressure" method. The composition is forced through one or more small orifices from a pressure chamber into the mold cavity.

Special machines are required for extrusion molding of thermoplastic materials. A loading chamber with automatic feeder is usually provided. Dies are brought into position with channels leading from the loading chamber and filled.

Thermosetting plastics to date require that a slight charge be placed in the loading chamber each cycle; so, in general, special assemblies and regular presses are used when thermosetting plastics are molded by the extrusion process.

The extrusion (transfer) type mold is used commercially to a limited extent for molded pieces which cannot ordinarily be molded by other processes, and which pieces have thin wall sections or of extreme irregularity in shape; also pieces having excessively long inserts which might become bent during molding operation.

Study is now being made of this type of molding with a view to determining if there are any advantages in its adoption for the production of Naval designs. It is believed that the usefulness of this method, should it prove successful, would be in the field of high impact material molding by reason of the increased possibilities of obtaining a more uniform density of the piece than is possible with pressure molding; particularly this would be true for pieces having small projections where pressure molding tends toward a separation of the fabric from the resin.

The uses and limitation of this type of molding will have to be determined from a Naval viewpoint by trial manufacture and subsequent tests of specific designs.

Special molds

Combinations and modifications of the fundamental types of molds are possible and are found in the molding industry. Such molds are characterized as "Special Molds." An occasion may arise when for a special molding problem such a mold may be required.

* Chief Electrical Draftsman of the Bureau of Engineering, Navy Dept.

Blowing molds

Blowing molds consist of simple dies, loaded with sheet or tube stock, which form a chamber of plastic, non-porous material which is expanded against the walls of the mold cavity by internal pressure. Pressure is introduced by compressed air, steam or the introduction of volatile salts within the plastic chamber, which generate gas pressure when heated.

Blowing molds are used exclusively for the production of hollow molded parts and only for the acetates and cellulose nitrates. Although the molds have no applications which are now foreseen for Navy work, they are mentioned in order to form a complete category of known mold constructions.

General design characteristics

There are certain features pertaining to the design of molds which are generally applicable to all types and classifications and may be considered under the heading of general design characteristics. These items follow:

Ruggedness, Bulk factor, Shrinkage, Draft, Materials.

Due to the enormous pressures under which molds operate, a primary consideration of mold design is ruggedness. Molds therefore, should be very substantially constructed and all parts thereof should be designed with ample strength to resist molding pressure without distortion, and to minimize damage from handling. Too much stress cannot be placed on this requirement, as many cases have been found where Government-owned molds distorted or broke while being operated.

The basic molding compounds are much greater in bulk than the resultant molded piece, as previously mentioned. This relation between the bulk of the molding compound and that of the molded piece, which varies greatly with the type of compound, is termed the "bulk factor." The term "bulk factor" is also applied to that characteristic of the mold which concerns the relation of the area of the loading chamber with that of the cavity.

In view of the fact that the bulk factor of the molding compounds varies from a 2-to-1 ratio to as high as an 8-to-1 ratio, it will be seen that the bulk factor of the molding compound to be used has a very important bearing upon the mold design and its cost, as each mold must be designed, in this respect, for the compound for which it is to be used. Procedures are in use governing the loading of molds and designs incidental thereto, that are

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BUILDING HARDWARE makers are turning to Tenite as a material better suited for knobs and handles than metal, glass or porcelain.

Tenite handles do not break, dent or tarnish. They are smooth and pleasantly warm to the touch. And they have color that never chips, peels, or wears off.

Tenite is being molded into many products more economically than they can be cast or machined of any other material. A 52-page book on Tenite and its many uses will be sent you on request.

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Tenite representatives: New York: 10 East 40th St.; Chicago: 2264 Builders Building; Detroit: 914 Stephenson Building; Leominster, Mass.: 25 Merriam Ave.; Pacific Coast: W. & G. Meyer & Co., San Francisco: Federal Reserve Building; Los Angeles: 2461 Hunter St.; Seattle: 710 Belmont Place.

TENNESSEE EASTMAN CORPORATION, KINGSPORT, TENN.

Subsidiary of Eastman Kodak Company

Door knobs and handles molded of Tenite by Reynolds Molded Plastics for the National Brass Company

as varied as the number of mold designs, in operation and the number of compounds in use. It would appear that the most simple solution of this matter would be for the mold designer to take the area of the finished piece, which is that of the cavity, and multiply this area by the bulk factor of the material to be used, then allowing sufficient loading area, above the cavity, to accommodate the calculated amount of bulk material. It is, however, not that simple, as questions of economy in mold construction, heat transmission, placing of inserts, weight of mold, etc., enter into the problem, which dictates restriction in the metal mass of the mold.

The principal method used to permit reduction of the loading area is to partially compress or "preform" the bulk material into a volume much less than the basic powdered material and of such form as to facilitate easy loading. This preforming or tabletting is extensively used, and the only objection to its use, so far as Navy designs are concerned, lies in the fact that some sort of auxiliary means are required to preform this tabletting operation, apart from the actual mold.

For C. F. I. (cellulose filler, best impact strength) bulk material, it has been found that the size of the filling space for molds, producing molded piece not exceeding 9 inches for both length and width, should be a minimum of 5.2 times the ultimate molded piece. Although C. F. I. has a bulk factor of 8 to 1, it may be readily reduced to 5.2 to 1 by a hand pressure or with slight tamping. If the molded piece produced by the mold is greater in both length and width than 9 inches, it is possible to reduce the filling space to less than the 5.2-to-1 ratio, as C. F. I. material may be "heaped up" in so large an area, and compressed somewhat more readily by hand.

For C. F. G. (cellulose filler, best general use) the filling space should be $2^1/_2$ times the ultimate molded piece.

For M. F. G. (mineral filler, best general use) the filling space should be $2^1/_2$ times the ultimate molded piece.

For M. F. G. material, for molds for receptacle plug tips, the filling space may be less than this ratio, in which case, a loose preform must be used.

If preforming or tabletting is used, the result is, of course, a smaller, cheaper mold which when once built precludes the use of bulk material and enforces the continued use of tablets. Where such a mold is approved, the drawing of the mold should show specifically the nature of the tablet used.

The design of molds should take into account the mold shrinkage of the material to be employed, in order to produce molded parts to the proper dimensions, within the limits of the tolerances indicated. Where the tolerances required are very close, the question of uniform shrinkage becomes of extreme importance. Samples taken from each cavity of the mold should be carefully checked for dimensions and fit.

Sufficient side-wall draft should be provided in the design of molds, to permit proper opening of the mold, withdrawal of mold pins, and removal of pieces from the mold. Draft is ordinarily from 1 to 3 degrees. For Navy designs it has been decided that for pieces requiring a deep draw, the chase should have a taper of about 1 degree to a point $^1/_8$ inch above the position of the piece when molded, above which it should be straight.

All parts of the mold should be steel of the highest quality and of the most suitable grade for the particular purpose. Specific applications are discussed under the detail discussion of the various parts of the mold.

Coming to the subject of "detail design" of molds, it is well to start with a categorical list of the parts forming the mold assembly, although mention has been made of many of these parts in discussing mold classifications.

In order to discuss these parts intelligently it is essential that some standard nomenclature be set up for referring to the various items forming the mold assembly. At present there exists such a variation of names applied to mold parts, by the manufacturers, that it has been found exceedingly difficult to refer accurately to these parts as they are now delineated and listed on mold drawings: To illustrate, taking, for example, the flash mold classification, it is found that there are over 50 names in use applying to the component parts of these molds. For instance, the plates of the mold are listed under all of the following designations: top, force, bottom, loading, inner, steam, pin, retainer, filler top pin, bottom pin, end, side knockout, and stripper. Likewise the mold pins have many names, such as: guide, monogram, identification, dowel, location, insert, hole, cavity, mold, impression, locking, support, supporting, strip, stripping, dummy, center, and knockout. In the same way the chase is termed the die, matrix, block shoe, etc.

In general, all molds have the following parts: cavity, chase, force plate (top), bottom plate, force plug, guide pins (top and bottom), monogram pin.

In addition, some molds in accordance with their classification, will have parts as follows; not all molds, however, having all of these parts:

Cavity plug (die), bottom plug, split followers, filler plate, stripper plate, spacer fork, spring box, hole forming pins, insert holding pins, knockout pins, knockout plate, ejection bar, steam plate, retainer plate, pin plate, dowel pin.

In practically all cases, nomenclature of parts, as listed above, will be found applicable to molds as used for Naval production. All of these names selected are indicative of the nature of the piece.

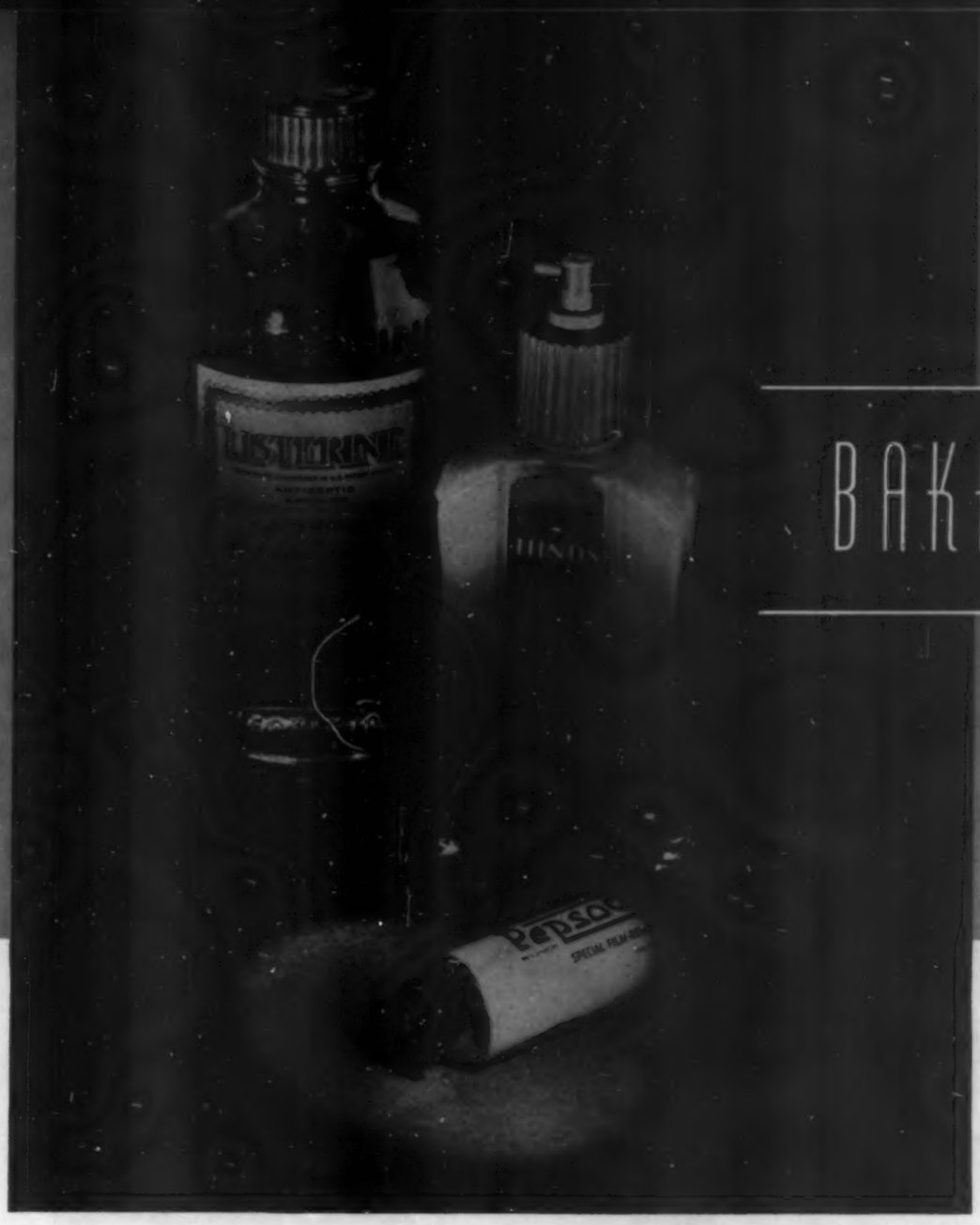
For discussion of the various parts forming the mold assembly, we will start with the cavity wherein the molded piece is formed.

The cavity is that part of the mold in which the molded piece is formed, and must accurately reproduce pieces within the tolerances specified for the design. Surfaces of the cavity in contact with the charge should be highly polished and properly hardened.

For molds producing Navy designed pieces, whether or not these molds are Government-owned, each mold cavity is required to have the following marking so disposed as to show properly on the finished piece:

(*a*) Navy drawing number or piece number of the piece in size of lettering as required by the drawing.

(*b*) Molder's trade-mark or symbol, contained within a $^5/_{32}$, $^7/_{32}$, or $^5/_{16}$ inch circle; (*Please turn to page 78*)



BAKELITE

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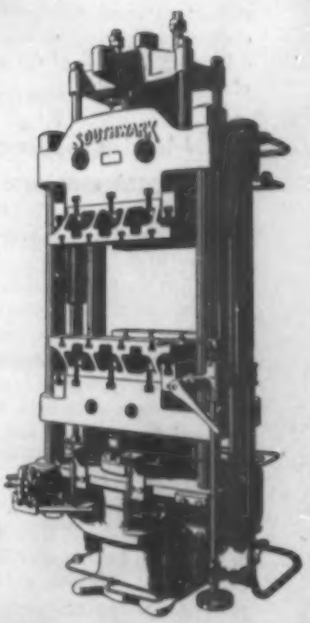
Tube and bottle closures are a specialized product of Wheeling Stamping Co. These small molded parts, attractive in color and finish, uniform in size and characteristics, some of them taxing ingenuity of design and production men alike (the new Hinds dispenser top, for example, assembled by Scovill Mfg. Co.) are produced in tremendous volume.

In the molding department at Wheeling, Southwark Presses run 24 hours a day, have been especially arranged and equipped to handle this particular type of product. Of them Wheeling Stamping says, "they are well adapted to our needs as regards reliability of function and economy of operation."

The advantages of Southwark Presses and auxiliary equipment are well stated in those two words, "reliability" and "economy." Consult with us about your particular problems or requirements... let us show you why leading molders prefer and use Southwark equipment.



BALDWIN-SOUTHWARK CORPORATION

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Pacific Coast Representative: THE PELTON WATER WHEEL CO., San Francisco

Consultants on Molding Equipment, Burroughs Engineering Company, Newark, N. J.

SOUTHWARK PRESSES

PLASTICS DIGEST

This digest includes each month the more important articles (wherever published) which are of interest to those who make plastic materials or use them

General

PLASTICS INDUSTRY CONTINUES UPWARD CLIMB. Chem. and Met. Eng. *41*, 88–9 (Feb. 1938). A trade review for 1937. The interesting features of the year are listed as the threat of the vinyl resins to the safety glass market for cellulose acetate, renewed activity in styrene resin, marketing of plastic wood (Masonite's lignin plastic), and increased consumption of resins for the treatment of fabrics. Some production figures given are: cellulose acetate in sheets, rods, and tubes 13,359,962 lb. in 1937 compared with 13,265,544 lb. in 1936; for cellulose nitrate 21,158,768 lb. in 1937 compared with 20,259,802 lb. in 1936; cast phenolic resin about 5,400,000 lb. compared with 6,000,000 lb. in 1936; and urea-formaldehyde resin a new high of 9,000,000 lb. compared with 7,000,000 lb. in 1936.

PLASTICS AS BASIC MATERIALS IN MACHINE DESIGN. H. S. Spencer. Machinery *44*, 364–5 (Feb. 1938). Plastics have quietly emerged from the knob and insulator stage into a full-fledged engineering material, ranking with metals in their importance to designers. Redesign to get the full advantages of plastics is urged rather than mere substitution for a metal part.

POSSIBILITIES OF SYNTHETIC RESINS IN DYEING, PRINTING, AND FINISHING. J. Wakelin. Textile Colorist *60*, 157–60 (Mar. 1938). The author speaks of the present period as "the 'resin' phase in the history of textile-chemical technology." Imparting resistance to creasing, improving the dyeing characteristics, waterproofing, weighting, and delustering are some of the multifarious uses of resins in this field.

Materials and manufacture

PROPERTIES AND APPLICATIONS OF POLYSTYRENE RESINS. H. P. Staudinger and H. M. Stanley. Chem. and Ind. (London) *57*, 141–4 (Feb. 12, 1938). A review. It is stated that their good electrical properties at ordinary and slightly elevated temperatures and their stability to light, moisture, and many chemicals, should make the styrene resins adaptable for high-grade insulating material, the manufacture of handles, buckles and buttons and for containers and closures for cosmetic and other compounds where odor, color and stability are important.

KOROSEAL A, B, C'S. H. E. Fritz and S. L. Brous. India Rubber World *97*, 41–2+ (Mar. 1, 1938). A summary of the properties and applications of this plasticised vinyl chloride resin.

PLASTICS FOR THE ELECTRICAL INDUSTRY. W. Blakey. Elec. Review (London) *122*, 83–4 (Jan. 21, 1938). Includes a table of the electrical properties of various plastics.

KOMROK, A NEW PLASTIC MATERIAL FOR THE BUILDING TRADE. Plastics (London) *1*, 16–18 (Jan. 1938). The essential ingredients are a pure inert silica filler and a highly viscous synthetic resin binder. Cement, lime, woodflour or bitumen is not present. The material will harden at ordinary temperature, but does so more rapidly at 170° C. Tiles in pastel shades can be made; the neutral ingredients do not cause fading. The material may be used for jointless floorings, wall coverings, panels and the like. It is also said to be suitable for exterior constructional purposes.

Applications

PLASTIC LENSES. British Plastics *9*, 489 (Feb. 1938). The use of methyl methacrylate resin for ophthalmic lenses, simple lenses, including aspherical magnifiers, opera glass oculars and objectives, camera view finders and meniscus objectives, optical flats and prisms, and non-optical articles such as illuminated dials and panels for various industrial purposes is briefly discussed.

FABRICATION OF LINOLEUM. Rev. Gén. Mat. Plastiques *13*, 371–3 (Dec. 1937). Rosin, New Zealand kauri resin, and oxidized linseed oil neutralized with calcium carbonate are used in the preparation of the binder for linoleum. The cork comes from Spain, Portugal, Algeria, and Russia.

EXPERIMENTS ON PIPE COATINGS. C. Fitzgerald and M. G. Johnson. Ind. and Eng. Chem. *30*, 294–6 (Mar. 1938). Use of black stock cellulose nitrate sheet 10 mils thick for wrapping underground pipes to protect them from soil corrosion is described.

INSULATING MATERIALS IN 1937. A. R. Dunton. Electrician *120*, 104–5 (Jan. 28, 1937). A review of various new applications.

FLEXIBLE EBONITE. T. L. Garner. British Plastics *9*, 488 (Feb. 1938). Neoprene does not vulcanize to an inelastic product similar to hard rubber. Therefore, by incorporating it in hard rubber formulas, a flexible product can be obtained. It is stated that ebonite made with Buna synthetic rubber softens at 120° C. compared with 65° C. for ordinary hard rubber.

Synthetic coatings

TRENDS IN INDUSTRIAL FINISHES. W. Krumbhaar. Chem. and Met. Eng. *45*, 9–11 (Jan. 1938). Development of rapid-drying baking finishes made with synthetic resins continues for automotive, furniture, and refrigerator industries.

RCA FINISH TESTING AND STANDARDIZATION. A. L. Pipper. Am. Machinist *81*, 1213–15 (Dec. 15, 1937). Tests for scratch resistance, abrasion, and bending of paint finishes are described.

PRIMERS: TESTING AND SELECTING MODERN MATERIALS. E. E. Halls. Automobile Eng. *28*, 35–7 (Jan. 1938). Bending and scratching procedures and aging in humidity cabinet and salt spray bath are discussed.

STRENGTH OF NITROCELLULOSE SOLVENTS. A. K. Doolittle. Ind. and Eng. Chem. *30*, 189–203 (Feb. 1938). Comparative toluene dilution ratios and viscosities of nitrocellulose solutions using pure solvents and solvent coupler mixtures are combined on a single phase diagram for complete evaluation of the solvent characteristics.

Chemistry

SYNTHETIC RESINS FROM COAL-TAR HYDROCARBONS. W. H. Carmody, W. Sheehan, and H. Kelly. Ind. and Eng. Chem. *30*, 245–51 (Mar. 1938). Hydrocarbon resins have been produced by a new heat polymerization process from unsaturated aromatics present in crude solvent naphtha, namely, dicyclopentadienes, indene, and coumarone. These resins are unaffected by practically all industrial brines, acids, and alkalies. Their low cost and chemical resistance are said to make them of interest to the paint, varnish, floor tile, molding, and adhesive industries.

REACTION OF SULFUR DIOXIDE WITH OLEFINS. R. D. Snow and F. E. Frey. Ind. and Eng. Chem. *30*, 176–82 (Feb. 1938). Certain olefins, such as isobutene, react with sulfur dioxide to yield resinous products that give coherent moldings of requisite mechanical and electrical properties.

SYNTHETIC RUBBER. Chemical Age (London) *38*, 49 (Jan. 15, 1938). Hydrogenation of furfural yields tetrahydromethyl furane which splits off water to form piperylene. The latter substance can be polymerized to a rubber-like product by warming in the presence of sodium wire.

WHY ARE CELLULOSE ETHERS SOLUBLE IN WATER? J. Wakelin. Textile Colorist *60*, 81–2 (Feb. 1938). Less mutual hindrance of the hydroxyl groups when H is replaced by an alkyl radical. The ethers prepared in quaternary ammonium derivative are more soluble than those obtained using caustic soda because of the better distribution of the alkyl radicals along the chain.

POLYMERIZATION OF METHYL METHACRYLATE IN ORGANIC SOLVENTS. D. E. Strain. Ind. and Eng. Chem. *30*, 345–7 (Mar. 1938). See abstracts in Sept. 1937 issue of MODERN PLASTICS, page 39.

U. S. PLASTICS PATENTS

Copies of these patents are available from the U. S. Patent Office, Washington, D. C., at 10 cents each

SAFETY GLASS. J. H. Sherts and B. J. Dennison (to Duplate Corp.). U. S. 2,106,766, Feb. 1. Applying a powdered plasticized resin to a plate of glass, hot pressing to effect adhesion without colloiding the resin, then applying a second glass plate and heating under pressure till the resin is colloided to a strong transparent interlayer.

SHRINK CAP SEALS. T. F. Banigan (to E. I. du Pont de Nemours and Co.). U. S. 2,106,786, Feb. 1. A hollow pellicle of pigmented cellulosic gel, which shrinks by dehydration and is stained by iron, is treated with a water-soluble nitrite in event of discoloration.

CELLULOSE ACETATE. G. A. Richter (to Brown Co.). U. S. 2,106,811, Feb. 1. In hydrolyzing chloroform-soluble cellulose acetate to make it soluble in acetone about 0.5% of hydrogen peroxide (calculated on the dry weight of cellulose) is added to improve the effect.

INSULATED WIRE. L. McCulloch (to Westinghouse Electric and Mfg. Co.). U. S. 2,106,850, Feb. 1. Winding electrical conductors in tape which has been impregnated with a solution of polystyrene in monostyrene, embedding in hot resin and heating under pressure to harden the polystyrene.

WATERPROOF BAGS. Chas. V. Brady (to Bemis Bro. Bag Co.). U. S. 2,106,867, Feb. 1. A laminated waterproof sheeting material made of paper with a fabric backing and a face of thin chlorinated rubber membrane, both backing and face being cemented to the paper by a suitable adhesive.

PLASTICIZER. Ritchie H. Lock. U. S. 2,107,203, Feb. 1. Use of glycerol monolactate triacetate as plasticizer in cellulose derivatives for molding compositions.

BLEACHING RESINS. A. G. Hovey (to Helmuth Reichhold, Reichhold Chemicals). U. S. 2,107,610, Feb. 8. Bleaching alkyd resins by incorporating up to 0.5% by weight (calculated on total resin ingredients) of citric, tartaric or oxalic acid in the resinification mixture near the end of the cooking process.

VISCOSE SPONGE. Pierre Lefebvre-Carnot and L. P. G. Vautier (to Soc. Francaise de la Viscose S. A.). U. S. 2,107,637, Feb. 8. Viscose sponge is made within a sheath of material which is proof against the chemicals used in the process; after making the sponge the sheath is stripped off.

DEODORIZING CHLOROPRENE. A. D. Macdonald (to B. B. Chemical Co.). U. S. 2,107,796, Feb. 8. Plastic polymerized chloroprene is milled with alcohol for long enough time to remove malodorous impurities.

SIZING FABRIC. E. K. Bolton (to E. I. du Pont de Nemours and Co.). U. S. 2,107,852, Feb. 8. Sizing textile fabrics with water-insoluble methylcellulose by dissolving it in aqueous alkali in the cold (near the freezing temperature).

INSULATION. C. F. Obermaier (to General Electric Co.). U. S. 2,107,901, Feb. 8. Joining cellulose acetate sheeting to a layer of asbestos to make electrical insulation with high dielectric strength.

FILM FORMER. Walter D. Bowlby. U. S. 2,108,001, Feb. 8. Impregnating nitrocellulose under pressure with a soap to make a stable film-forming material.

TUBING. Wm. Salemme (to Celluloid Corp.). U. S. 2,108,022 and 2,108,023, Feb. 8. A cellulose acetate tube, free of distorting or collapsing stresses, with its edges joined in a straight lateral seam; and a heated drawing device for making such tubing from thermoplastic cellulose acetate.

METHACRYLATE RESIN. J. W. C. Crawford and J. McGrath (to Imperial Chemical Industries, Ltd.). U. S. 2,108,044, Feb. 15. Granulated methacrylate ester polymers are made by dispersing the ester in a liquid in which it does not dissolve, and polymerizing while stirring to keep the particles in suspension.

UREA RESIN. K. Eisenmann and H. Scheuermann (to Plaskon Co., Inc.). U. S. 2,108,113, Feb. 15. Making a resin by acid condensation of a methylolurea in an alcohol solvent (not higher than hexyl alcohol) which also contains a higher alcohol (octyl or higher).

ANATOMICAL CASTS. A. Schummer and E. Trommsdorff (to Röhm and Haas Co.). U. S. 2,108,181, Feb. 15. In making casts of human or animal organs the canals and cavities are filled with a polymerizable substance which is then converted to a hard polymer; chemical destruction of the natural tissue then leaves the cast.

HYDROCARBON RESIN. N. D. Scott and J. F. Walker (to E. I. du Pont de Nemours and Co.). U. S. 2,108,213, Feb. 15. Making a resin by reaction of a sodium derivative of an acenaphthene (or naphthalene) homolog with a homolog of dihydroacenaphthene or of dihydronaphthalene.

SOLUBLE RESIN. Felix Lauter (to Sealkote Corp.). U. S. 2,108,341, Feb. 15. Acid condensation of phenol with formaldehyde in presence of phthalic acid, glycerol and lactic acid to make a combined phenolic and alkyd resin which is soluble and fusible.

CELLULOSE MIXED ESTERS. Henry B. Smith (to Eastman Kodak Co.). U. S. 2,108,452, Feb. 15. A transparent flexible sheet material is made of a low-substituted cellulose mixed ester plasticized with 5–25% of a lower alkyl (methyl to butyl) ester of a higher fatty acid (myristic to stearic).

ETHER RESINS. W. Becker and L. Orthner (to I. G. Farbenindustrie Aktiengesellschaft). U. S. 2,108,468, Feb. 15. Sulfurized ether resins are made from ammonium polysulphide (or an alkali or alkaline earth polysulphide) and dichloroethyl ether in presence of water and barium sulphate.

LACQUER. Ernst Helft (to American Hyalsol Corp.). U. S. 2,108,768, Feb. 15. Use of a small proportion of dodecyl alcohol in a pigmented nitrocellulose lacquer.

MOISTUREPROOF WRAPPERS. T. G. Finzel and D. E. Drew (to E. I. du Pont de Nemours and Co.). U. S. 2,108,804-5-6-7-8-9-10, Feb. 22. Transparent moistureproof wrapping paper is made by waxing a thin porous sulphite tissue and lacquering with a thermoplastic nitrocellulose in solution with a plasticizer such as tricresyl phosphate, transparent effects being obtained with the aid of a resin.

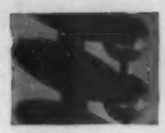
VINYL POLYMERS. H. Hopff, P. Garbsch and F. Teller (to I. G. Farbenindustrie Aktiengesellschaft). U. S. 2,108,857, Feb. 22. Thermal polymerization of vinyl acetate or other vinyl esters in presence of a peroxygen compound and an anhydride of a strong fatty acid.

MOISTUREPROOF PACKAGE. W. J. van Rossem (to Surgident, Ltd.). U. S. 2,108,953, Feb. 22. A moistureproof wrapping for a hydrous colloid is made from a polyvinyl chloride resin.

PRINTING PASTES. W. Reppe and A. Schneevoigt (to General Aniline Works, Inc.). U. S. 2,108,994, Feb. 22. Thickening dye pastes with an interpolymer of a water-soluble and a water-insoluble vinyl ether.

RESIN VARNISH. A. G. Hovey and T. S. Hodgins (to Helmuth Reichhold, Reichhold Chemicals). U. S. 2,109,291, Feb. 22. A coating composition containing a urea-formaldehyde resin blended with an unmodified alkyd resin made with excess of the polyhydric alcohol component.

PLASTIC. S. Morgenstern and J. Eggert (to Deutsche Hydrierwerke Aktiengesellschaft). U. S. 2,109,432, Feb. 22. Plasticizing casein (or other protein) plastics with a higher alcohol, from dodecyl to octadecyl alcohol.



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FOREIGN PLASTICS PATENTS

Application dates are given for patents of European countries, but for Canada the issue date is given

ELECTRICAL INSULATION. I. G. Farbenindustrie A.-G. French P. 817,539, Feb. 10, 1937. Urea-formaldehyde, aniline-formaldehyde or alkyd resins are combined with aldehyde condensation products of melamines, guanamines or pyrimidines to make molding compositions having high insulating power, light fastness and waterproofness.

CABLE WINDINGS. Siemens und Halske A.-G. Italian P. 344,-113, Aug. 3, 1936. Conductors for high frequency cables have at least 2 separate spiral windings made of polyvinyl alcohol or polystyrene.

GLUTEN PLASTIC. International Patents Development Co. French P. 818,031, Feb. 17, 1937. Gluten from maize (protein content about 50%, starch content about 35%) is treated with aqueous formaldehyde, then with dilute hydrochloric acid, and the resulting plastic is molded to shapes which are hardened and waterproofed by heat.

COLORING PLASTICS. Gesellschaft für Chemische Industrie in Basel. French P. 817,814, Feb. 13, 1937. Uniform coloring of plastics made of nitrocellulose, cellulose acetate or the like is achieved by the use of dyes containing at least one OH group esterified with a dicarboxylic or sulphocarboxylic acid or with carboxylic acids having a dialkylamine substituent capable of forming quaternary salts.

INSULATING VARNISH. Compagnia Generale di Elettricita. Italian P. 344,686, Aug. 12, 1936. An alkyd resin varnish which is especially useful for insulating coatings on metals is made with glycerol, phthalic anhydride, linseed oil acids (with or without soy bean oil acids) and copal resin.

METHACRYLATE ESTER. Rowland Hill (to Canadian Industries Ltd.). Can. P. 371,127, Jan. 11, 1938. New polymerizable esters are made by catalytic esterification of acrylic or methacrylic acid with a glycol in presence of a polymerization inhibitor such as Cu powder.

METALLIZED FABRIC. C. B. Hall and J. D. McBurney (to Canadian Industries Ltd.). Can. P. 371,130, Jan. 11, 1938. A coated fabric with bright metallic finish is made by coating a fabric with a nitrocellulose cement and then with a preformed cellulose acetate film which has been coated with aluminum powder and burnished.

VINYL RESIN. S. D. Douglas and C. O. Young (to Carbide and Carbon Chemicals Corp.). Can. P. 371,133, Jan. 11, 1938. Making tough, resilient, heat-resistant resins by polymerizing a mixture of vinyl chloride and vinyl acetate in presence of benzoyl peroxide and a metal promoter which may be lead, tin or aluminum.

ADHESIVES. B. J. Humphrey (to Firestone Tire and Rubber Co. of Canada). Can. P. 371,143, Jan. 11, 1938. A cement for firm bonding of metal to rubber is made by dispersing rubber in a divinylacetylene polymer (synthetic drying oil) and incorporating a drier in the dispersion.

SHEETS AND RODS. P. H. Hull (to Imperial Chemical Industries, Ltd.). Brit. P. 469,564, Jan. 27, 1936. Molding sheets, rods or other shapes from a liquid mixture of vinyl acetate and methyl methacrylate by filling a vertical mold (open at the top) with the liquid, enclosing it in an autoclave and heating progressively upward from the bottom to polymerize the mixture.

SYNTHETIC RUBBER. B. J. Habgood and L. B. Morgan (to Imperial Chemical Industries, Ltd.). Brit. P. 470,269, Feb. 11, 1936. Bonding natural rubber to a composition of synthetic rubber and acrylonitrile or acrylate ester resin by an adhesive layer of synthetic (butadiene) rubber to make an oilproof, abrasion resisting, sunfast rubber substitute.

CHLORINATED RUBBER. N. A. de Bruyne (to De Havilland Aircraft Co., Ltd.). Brit. P. 470,331, Jan. 31, 1936. Reinforcing chlorinated rubber with a stretched fabric which has been impregnated with a phenol-formaldehyde resin.

BEARINGS. Electrolux, Ltd. Brit. P. 470,807, Jan. 19, 1937. Porous synthetic resin bushings for bearings are molded on a shaft by forming the bushing in an electrically heated sleeve and pressing with a piston onto the shaft.

DIELECTRIC. British Thomson-Houston Co., Ltd. Brit. P. 470,-897, Dec. 12, 1936. An electrically resistant composition for use as a dielectric is made of titanium dioxide and a plasticized vinyl chloride resin, or an alkyd resin, as binder.

FRICTION FACINGS. J. E. Pollak (to American Brakeblok Corp.). Brit. P. 471,120, Feb. 26, 1936. To prevent loss of friction grip in brake bands or the like while in service the impregnating composition of polymerized drying oil, phenol-formaldehyde resin, coal and asbestos is blended with an unstable metal compound such as lead formate.

POLYSULPHIDE RESINS. I. G. Farbenindustrie Aktiengesellschaft. German P. 653,993, Feb. 21, 1934. Resins of the "Thiokol" type are made from an inorganic polysulphide and an aromatic dichloride in which the 2 chlorine atoms are in an aliphatic side chain.

POLYVINYL KETONE. I. G. Farbenindustrie Aktiengesellschaft. German P. 653,945, July 7, 1934. Making a plastic composition by treating polyvinyl ketone with an alkaline reagent.

MOLDED PHENOLICS. Richard Hessen (to Aug. Nowack Aktiengesellschaft). German P. 653,959, March 12, 1930. Adding a hardening agent to a resol or novolak resin and molding in the cold, in presence of a hydrogenated phenol or cresol.

CABLE WRAPPINGS. Norddeutsche Seekabelwerke Aktiengesellschaft. German P. 654,299, July 20, 1933. Flexible tapes or foils of polystyrene are made by extrusion and are laterally stretched during or immediately after extrusion; used for insulating windings on cables.

INSULATED WIRE. Leo Kandler (to Kabelfabrik- und Drahtindustrie-Aktiengesellschaft). Austrian P. 151,219, March 4, 1936. Rubber insulation on wire is protected from deteriorating influences by a shielding layer, both outside and inside, of a vinyl or acrylic acid resin.

INSULATION. Siemens und Halske Aktiengesellschaft. French P. 818,964, March 9, 1937. Making electrical insulating material, characterized by low density, from vinyl resins by blowing air or an inert gas into the liquefied resin.

NEWS

A MOTORCADE OF "THE WORLD OF TOmorrow," sponsored by the New York World's Fair 1939, will arouse the lethargic citizens and astound visitors in the tranquil city of New York on Saturday the 30th of this month. From celebrated Washington Square on the 149th anniversary of George Washington's inauguration as President of the United States, the parade will start.

Brilliant, colorful floats representing the Nations of the World, national and retail exhibitors, department stores, hotels, bands, army, navy and national guard will participate in the event. Plastic models of buildings now being constructed at the World's Fair Grounds will be seen. Preceding all this on Friday night, April 29th, the Junior League will stage a Charity Ball at the World's Fair Site.

The reason for this vast Pre-view of the plans and accomplishments to date is to inform the public and to give the states of the nation a peek at just what they may expect to see. And, incidentally of course, to arouse prospective Exhibitors to the fact that available, desirable space in this "World of Tomorrow" is rapidly being absorbed. We know there will be 3 plastics exhibitors in the Chemicals and Plastics Building but there should be a hundred.

H. J. WILLIAMS FORMERLY WITH INDEX MAchinery Corporation has joined the Grotelite Company where he will devote his efforts to the promotion of this company's new injection molding press.

THE TECHNICAL FEATURE OF THE REGIONAL Meeting of the American Society for Testing Materials was the Symposium on Plastics held in the afternoon of March 9. Approximately 500 attended the session, of whom about 175 registered especially for the symposium. Six papers were presented dealing with various phases of the committee's work. These papers, which were listed in the February issue, will be published either in full or in abstract form in subsequent numbers of this journal through the courtesy of the A.S.T.M.

The five subcommittees of D-20 held meetings on March 9 and 10 to hear and discuss progress reports on the development of standard test methods for the various properties covered by the respective groups, namely, strength, hardness, thermal, optical, and permanence. A number of methods have been written up in preliminary form by the subcommittees and are being subjected to further trial by the committee members prior to their presentation for adoption as tentative standards. The one topic which aroused the most discussion at the subcommittees' sessions was that of conditioning the test specimens. It became evident that agreement on some standard conditioning environment by the committee as a whole would be necessary in order to avoid needless confusion and inefficiency by the establishment of a multiplicity of conditioning procedures. The inclusion of the thermoplastic resins, cellulose derivatives and protein plastics among the materials to be covered by the tests formulated by this committee makes the establishment of mild or normal conditions of temperature and humidity for testing almost an obvious necessity.

At the meeting of the full committee on March 10, the following officers were unanimously reelected: Chairman, W. E. Emley, National Bureau of Standards; First Vice-Chairman, B. Andersen, Celluloid Corporation; Second Vice-Chairman, T. S. Taylor, Diehl Manufacturing Co.; Secretary, W. A. Evans, Bell Telephone Laboratories. The interest and enthusiasm displayed by the members and guests present plus the increasing recognition of the urgent need for standardizing the methods of testing plastics augurs well for valuable returns from the work of this committee in the near future.

WILLIAM B. PETZOLD, DESIGNER AND STYLIST, has returned to the Plastics Department of the General Electric Company at Pittsfield, Mass. Mr. Petzold, who

previously spent four years with the G. E. Co., will be responsible for the function of the styling section of the Plastics Department, which will now offer an even more complete designing service to its customers.

F. J. STOKES MACHINE CO. ANNOUNCES THE appointment of L. H. Butcher Co., Los Angeles, as representative for all Stokes equipment. This company has handled the Stokes line out of its San Francisco and other offices for a number of years. It is now representative for the entire West Coast, including the states of Washington, Oregon, California, Idaho, Nevada, Arizona, Utah, Montana and Wyoming in the U.S.A., and British Columbia in Canada.

A NEW PHENOLIC RESIN ADHESIVE IS ANnounced by General Plastics, Inc., known as their 5116 Resin Adhesive. It is stated that this material, in solution in a hydrocarbon solvent, has exceptionally high bonding strength. Is particularly efficient in bonding asbestos to sheet steel; rubber to metal or cellulose acetate materials; plastic molded parts; porcelain enam-

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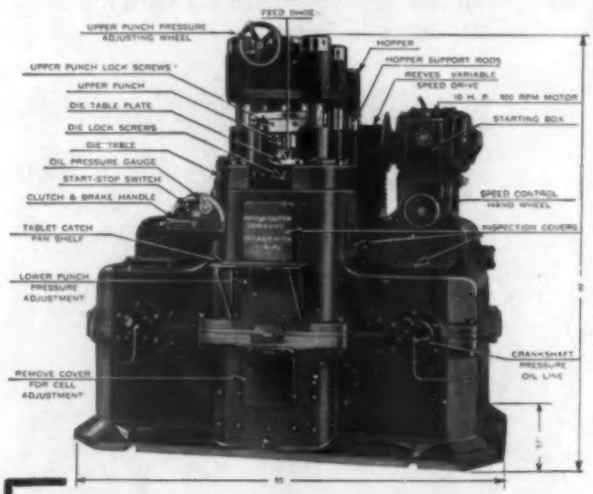

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NEWS

eled parts; cellophane or treated papers to steel, copper wire or wood. Unaffected by water, moderate heat, alkalies and mild acids. Used as a coating, it withstands a 50 percent caustic soda solution indefinitely. Retains its bonding strength up to 100° Centigrade. Softening point between 115° and 120°C. (A.S.T.M). It is anticipated its greatest value will be to manufacturers where cost is secondary to a satisfactory solution of their bonding problems.

THE DIVISION OF PAINT AND VARNISH CHEMistry of the American Chemical Society will meet in morning and afternoon sessions on Tuesday, April 19, at the Spring meeting of the society in Dallas, Texas. The Plastics Section will not meet separately from the Protective Coatings group. The program, which has been arranged by E. E. Ware, Chairman, and G. G. Sward, Secretary, comprises ten papers, listed herewith.

R. W. Kewish and D. F. Wilcock. Flow Properties of Paints. I. Leveling.

W. A. Bush. Aluminum Paint Derived from Aluminum Paste.

J. B. Dorsch and J. K. Stewart. The Evaporation Ratio of the Lacquer Solvent Mixtures. Ingredients of a Lacquer Solvent Mixture.

Charles D. Bogin and H. L. Wampner. The Effect of Solvent Variations on the Viscosities of Nitrocellulose and Lacquers.

T. S. Hodgins and A. G. Hovey. A Contribution to the Knowledge of Urea-Formaldehyde Condensation Products.

H. R. Kraybill, A. W. Kleinsmith and M. H. Thornton. Composition and Drying Rates of Commercial Soybean Oils.

A. L. Zinser. Paint and Varnish Specification and Control.

F. N. Speller. Pre-treatment of Metal for Painting.

Ferd Dieffenbach. Corrosion and Erosion and its Prevention in River and Harbor Structures.

S. L. Bishkin, Jack B. Shannon and T. J. Brewer. Exterior Tank Coatings in the Southern Petroleum Industry.

PLASKON COMPANY, INC., HAS PREPARED A sample card with molded Plaskon disks showing the twelve approved kitchen and bathroom colors established in collaboration with the National Retail Dry Goods Association, The National Bureau of Standards and others. These color samples may be seen at the offices of MODERN PLASTICS, 425 Fourth Ave., New York City, or at your molders.

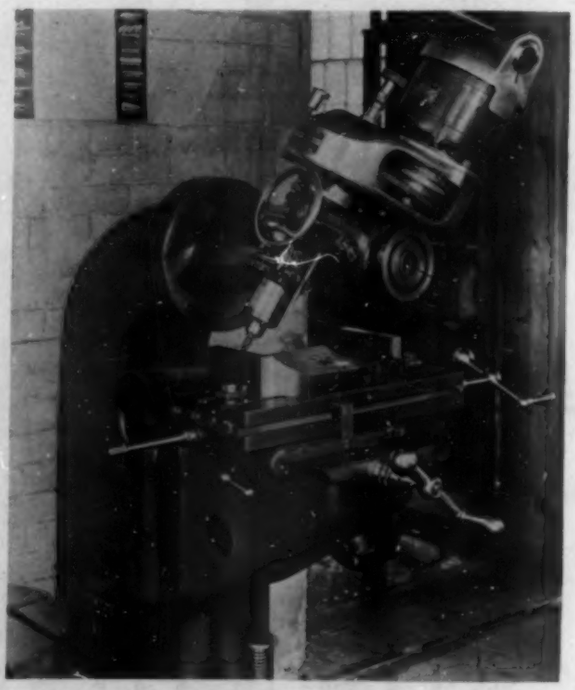
SYDNEY LEWIS OF ADVANCE MOLDING CORporation, 54 West 21st St., New York City, announces that this company has been established to do automatic injection molding of thermoplastics. Eckert-Ziegler and Reed-Prentice injection presses are being used.

MONSANTO CHEMICAL COMPANY ANNOUNCES, in a most attractive annual report to stockholders, the details incidental to the joining of the Fiberloid Corporation with its organization. The products of the Fiberloid Corporation are listed and described as well as pictured in a color process spread. Sheets and molding powders of vinyl acetate are under development.

E. F. RIESING, HEAD OF THE NEWLY ESTABlished Plastics Sales Division of Firestone Tire and Rubber Company at Akron, announces the addition to their Sales Engineering staff of C. H. Whitlock, formerly with General Industries.

THE NATIONAL INDUSTRIAL ADVERTISERS Association will hold its 16th annual conference in Cleveland, Sept. 21–23, it has been announced by Stanley Knisely, advertising manager of Republic Steel Corp., who, as vice president of the association, heads its committee for conference program and arrangements. Typical of some of these national committee activities was the recent development of publishers forms for three classifications of business papers, developed to provide more detailed and comparable data for space buyers and including editorial, or qualitative information, as well as additional industrial coverage and circulation data. Another report recently issued covered the influence of local dealers on the buying of space in trade papers.

THIS UNIVERSAL DIE MILLING MACHINE made by Reed-Prentice Corporation is shown operating on a spectacle temple die in the mold-making establishment of Guy P. Harvey and Son. Its pendulum type of adjustment permits it to reach any part of the mold held in the shaper table.



NEWS

WITH THE ANNOUNCEMENT OF NEW AND IMproved laminated phenolic insulation from the laboratories of United-Carr Fastener Corp. comes word that the production and marketing will be under the direction of Lester W. Tarr. Recently appointed to the executive staff of United-Carr, Mr. Tarr has an experienced record in the field of laminated synthetic plastic products obtained through twelve years association with the Continental Diamond Fibre Company.

THE TRANSPARENT BARRELS ON THE OIL CANS, illustrated as item 5 in our Review Section, March issue, were made of cellulose acetate molding compound, not Lucite as reported.

THE IMPORTANCE OF COMMERCIAL STANDARDS

by E. H. OTT*

STANDARDS OF QUALITY DEVELOPED AND adopted by Industry are of advantage not only to that Industry but—and this is at least of equal importance—to the Trade which that Industry serves. An illustration of the progress that has been made along this line is presented by the laminated products section of N.E.M.A.

Beginning with a membership of four companies, then pioneering in a comparatively new industry, the section has grown to its present membership of ten companies comprising the leading manufacturers in their field.

Among the activities in which the section has engaged are: (a) Compilation of Statistics, (b) Tariff Provisions, (c) Standards of Quality and Performance.

It is with the last named that we will confine ourselves on this article.

Among the first industry standards to be adopted were, quite naturally, those covering tolerance and thickness of sheets. This product is made by all manufacturers and is the form in which laminated products first obtained quantity production.

Later, standards on outside dimensions of rod and on inside and outside dimensions of tubing were adopted. Still later, standards on length of pieces cut from plate, rod, and tube followed.

These industry standards were extremely helpful to the trade as the customers, assured that their purchases, no matter from what manufacturer, would meet the limits as specified. Failing to do so, the customer had a definite and well established "come back" on his supplier.

As these standards were worked out in actual practice over a period of quite a few years time, they became definitely established and, as new manufacturers entered this field, they were favored by having a set of established standards as a basis for their manufacturing operations. New comers in the field accepted these provisions without any fear as to their being equitable and fair to both the manufacturer and customer.

Following these dimensional standards, the industry developed specifications on physical and electrical properties which had been an invaluable aid to design engineers in the proper selection of these materials. With so many excellent characteristics it is to be expected that any line of materials would have certain limitations. With a full knowledge of both, the design engineer is in the best possible position to select the right grade for the purpose he has in mind.

Another advantage to the customer was in the fact that no individual customer specifications had to be written by his engineer. The N.E.M.A. standards fulfilled every need along this line. Time which might be necessary to this subject could, therefore, be devoted to other important channels.

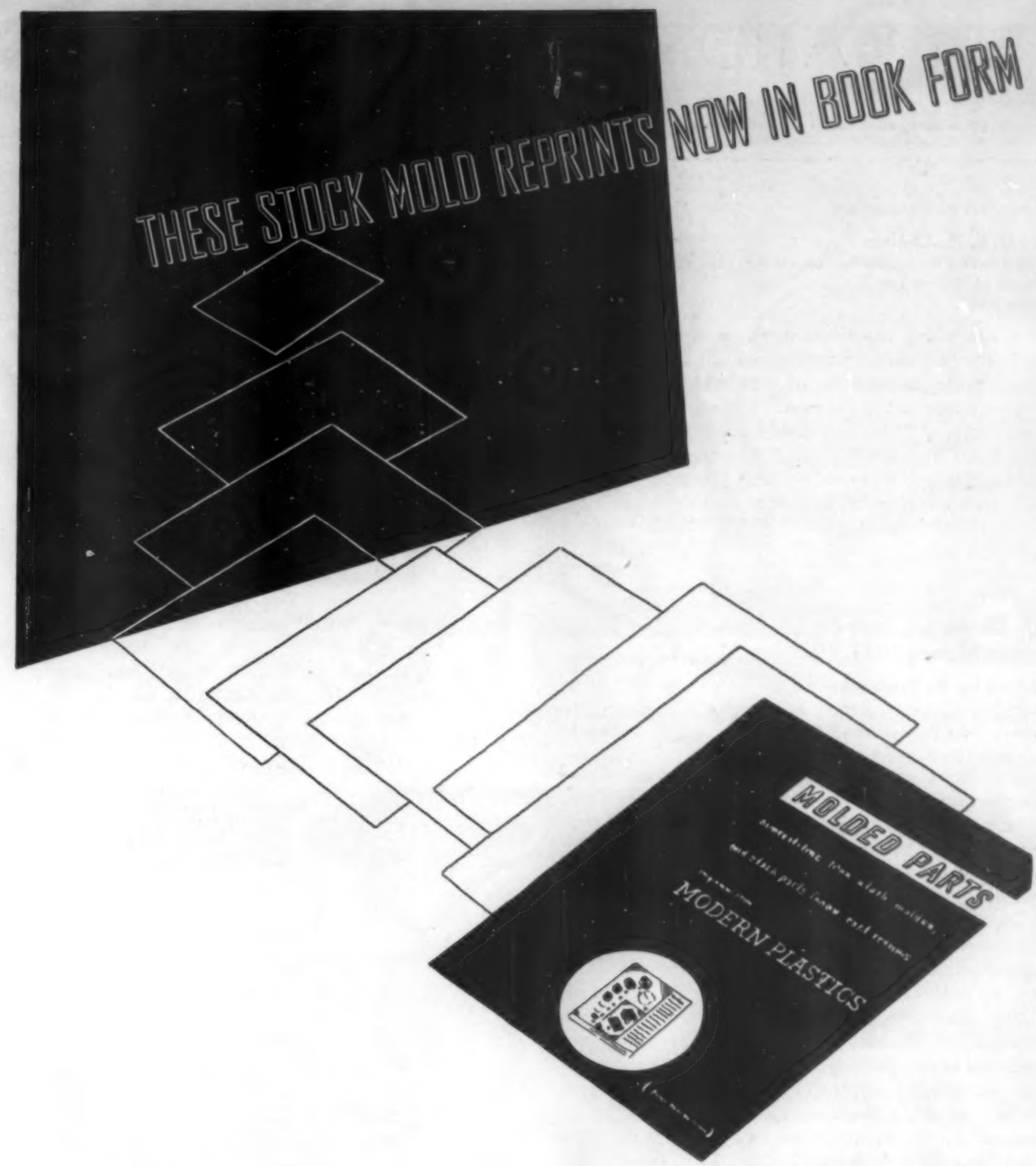
For fear that the impression might be gained that standards of this kind, once adopted by an industry, remain static, the history of the laminated products standards proves that such is not the case.

Changes have been made as important manufacturing facilities and closer control of process have developed with the product. All such changes, when proposed as the need developed for them, are presented to the Manufacturers' Technical Staff. The Technical Advisory Group comprising of technical representatives from each company, has frequent meetings and in the interim between meetings, time and study is given to all proposed changes or to new standards on phases not already covered in previous meetings.

This technical advisory group has this matter of industry standards continually before it. The need of new standards is self-evident in some cases. Every effort is being put forth to fulfill this need.

Change, as we all know, does not always mean progress. However, this laminated products industry has made each change in a forward direction assuring proper balance and good sound commercial engineering and application by design engineers to the best advantage in their products.

*Westinghouse Electric & Manufacturing Co.



In response to the innumerable requests that have come to Modern Plastics . . . . to make even more convenient the use of these popular pages . . . . and for our thousands of new subscribers, Modern Plastics has published a special complete booklet reprinting all Stock Mold pages published since December 1935.

This booklet is now available for distribution. Your letterhead mailed to Modern Plastics with only $.25 in coin or postage will bring a copy to you.

MODERN PLASTICS

425 Fourth Avenue, New York, N. Y.

PUBLICATIONS

Booklets reviewed in these columns will be sent without charge to executives who write for them on their company letterheads. Other books will be sent postpaid at the publishers' advertised prices

The Art of Packaging

by D. E. A. Charlton

Published by The Studio Publications Inc., New York and London, March 1938

Price $6.00. **127 pages**

A compelling exposition of the intelligent thought and comprehensive planning which have brought merchandise packaging to its present high level of importance here and in England. Beginning with "Why the Package," Mr. Charlton takes his readers from "cocktails to dessert" through the various essentials of package design, materials, construction and equipment, in a chatty text which is neither boring nor too long. More than 100 photographs of American and British packages illustrate the work. E. F. L.

Deutsches Jahrbuch Für Die Industrie Der Plastischen Massen 1937/1938

Edited by W. Pansegrau

Published by Verlag Wilhelm Pansegrau, Berlin-Wilmersdorf 1, 1937. Price (foreign) RM 9.50 **320 pages**

This book presents a review of the technical and German patent literature, a group of articles on special phases of the plastics industry, and a directory of trade names and German sources of supply of plastic materials and equipment Each of these subdivisions covers approximately 100 pages. The literature review, covering both domestic and foreign publications, is especially noteworthy, and it is a satisfaction to find so many references to articles contributed to MODERN PLASTICS by the technical representatives of plastics firms in the United States. A list of the subjects and authors of the various chapters will indicate the diversity of material included in this yearbook: "The German plastics industry in the four year plan" by W Pansegrau; "The development of the plastics industry in Germany" by W. Schmandt; "Literature review for 1936/1937" by A. van der Werth; "Plexigum and Plexiglas" by E. Trommsdorff; "Manufacture and fabrication of protein plastics" by F. Bonte; "Lithopone in the plastics industry" by F. Ohl; "The manufacture of synthetic resin buttons" by P. Bauer; "Injection molding" by Gastrow; "Duplicating and hobbing machines for making molds" by P. Grodzinski; "Fabricating equipment" by Sennwitz; "German patents relating to the production of plastic materials" by W. Weuringh (covers the period from January 1, 1936, to June 30, 1937); "Trade names and manufacturers addresses"; "Directory of sources of materials"; and a "Bibliography of books and journals on plastics."

G. M. K.

Stock Mold Booklet

Published by MODERN PLASTICS

Price: 25c in postage or coin **64 pages**

Because we have received so many inquiries from our readers for information about stock molds and stock items from cast resin, we have reprinted all the Stock Mold pages which have appeared in MODERN PLASTICS from Dec. 1935 through March 1938 in booklet form.

At the back of this book, the item numbers, sheet numbers, and manufacturers' names and addresses are conveniently listed and requests for prices and samples may be sent direct to the owners of the molds.

GENERAL ELECTRIC COMPANY HAS RECENTLY released several fly leaves printed in two colors covering the subjects: Combination Magnetic Switch, Electrical Indicating Instruments for time studies and other production savings, Strip-Chart Recording Instruments, The Keys to Your Control Problems, and Push Button Stations and other manual electric controls.

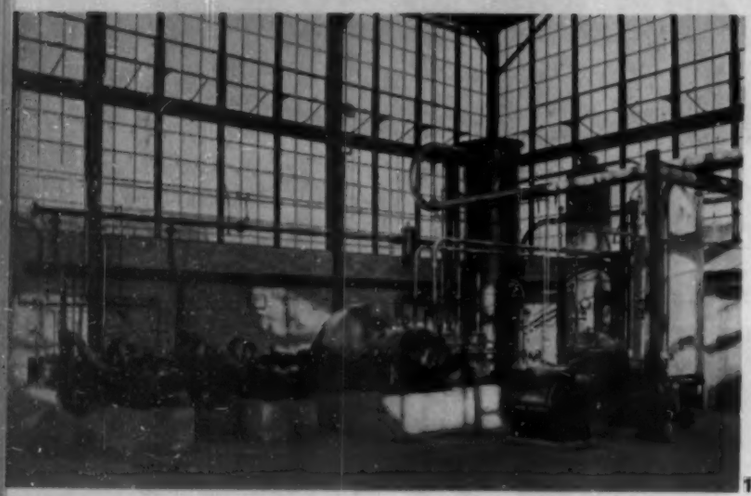
HERCULES POWDER COMPANY HAS ISSUED A loose-leaf handbook on chlorinated rubber (Tornesit) in which this material is described, showing its general, physical, electrical, mechanical, thermal and physical-chemical properties. There is a chart showing compatible and incompatible plasticizers and suggestions of applications to which this material is suited.

A READY REFERENCE FOR PLASTICS, COMPILED and published by the Boonton Molding Company has been revised and brought up to date. It gives a brief description of the commonly used plastics and their origin for the guidance of engineers and buyers and is written by George K. Scribner, president of the Boonton Molding Company. Each of the more commonly used compounds is detailed with properties charts and suggested applications and provides the layman with one of the most helpful books available.

SPECIAL EMPHASIS IS GIVEN TO THE USE OF laminated materials in the chemical, textile, architectural, automotive, electrical, mechanical and industrial fields in a new 48-page, illustrated booklet titled, Bakelite Laminated, published by the Bakelite Corporation. It describes the range of laminated products that are available and illustrates their diversified applications as well as discussing the individual physical, electrical and mechanical properties of laminated sheets, tubes and rods. Both industrial and decorative applications are illustrated and described. This is by far the most complete and informative book on laminated plastics that we have seen.

AMERICAN NICKELOID COMPANY HAS ISSUED an informative booklet on Pre-Finished American Bonded Metals, in which many uses of these metals are described and pictured. There are many suggestions too, of the successful combination of plastics with these materials.

9



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PROGRESS THROUGH EXPANSION

(*Continued from page 29*) molding, both compression and injection, that we are sure to experience."

Molding at the Jackson plant began in 1921 when fourteen presses were installed. Now there are 108 with 10 injection machines. The Cambridge plant has provision for nearly twice that number of presses which will be added to the twenty already in operation as rapidly as business demands.

The most striking thing perhaps upon visiting the Cambridge plant is that everything is new—and clean. There are twelve 450-ton presses; four 300-ton; and four of 250-ton capacity, lined up with plenty of space between so that a man has access to all parts of each press, more than three-quarters of the way around, for easy maintenance and for setting up and taking out molds. These presses face sunny windows with a wide aisle between for transporting materials and removing parts. Each is provided with a pressed steel work table for preforms and equipment. Wood platforms are placed in front of the row of presses so that operators will not be required to stand on the cement floor. These platforms also allow flash to drop through, out of the way. All controls on the presses are arranged at the right-hand side with levers that are readily accessible and at the right height.

Frames for the presses are cast from the company's own patterns and then machined and assembled in the company's plant at Jackson. They are of special design and equipped with a quick exhaust valve which speeds up the lowering of the press with resulting increased production. For urea materials, however, the quick get-away is a bit too fast so a needle valve is provided in the line to hold back the lowering a fraction of a second, just enough so the job can be "breathed" and return without dropping too far. (*Please turn the next page*)

These views of the power house show the mechanically stoked boiler (Fig. 9), accumulators and electrically driven pumps (Fig. 10), the company-owned battery of transformers (Fig. 11), and the electric control panels (Fig. 12)

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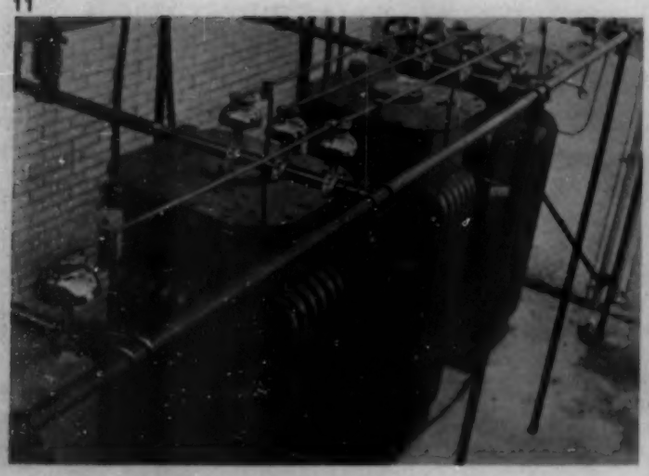

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In the center of the molding room is the foreman's office and first-aid room, which is glass partitioned to keep out noise and dirt. From this point, he can see any part of the molding shop in either direction.

Piping

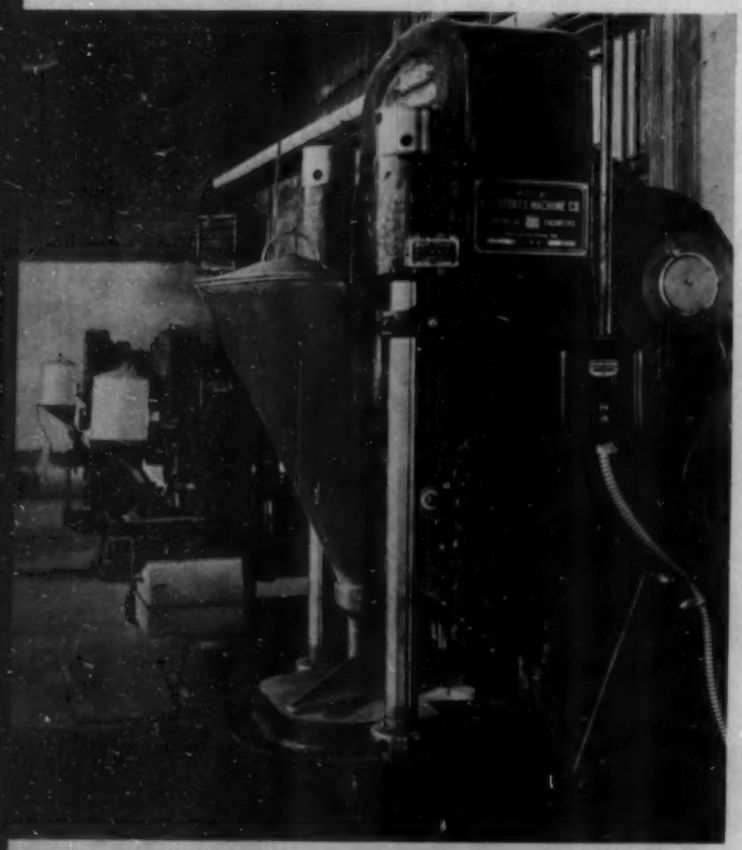
The hydraulic piping is of welded construction and therefore, cannot leak. This includes the high-pressure supply; the low-pressure supply; and the water return. There are but two or three screw fittings used and these have flange connections to keep them tight. Pipes are arranged horizontally behind the presses where they are easy to maintain. They are arched at press intersections to make passageway for electric trucks and workers.

The mains are dropped into a trench which runs the length of the molding room to carry off any leakage should it occur and the trench is bridged between divisions of presses to permit trucks to cross. Both the high and low pressure lines are equipped at either end with shock-absorbers to take care of any shock that may come to the line if more than one valve should be closed at the same moment.

The presses are placed in a single line where each is served by a 3000-pound hydraulic line, a 500-pound hydraulic line, a 125-pound compressed air line, a 150-pound steam line, and a 65-pound cold water line. Multiple control valves, manually and automatically operated, control the sequence of press operation. The press is closed by pressure from the 500-pound line, then the 3000-pound pressure does the actual molding work. Steam regulates the molding temperature during polymerization while cold water is used to cool the molds before the castings are removed. The air line supplies force to remove flash from the molds and to clean them prior to each charge of plastic compound. The steam lines are insulated and hydraulic lines are rigidly anchored to prevent vibration. Outlets at the presses are divided with the valves necessary to permit isolation of individual presses when required. Piping and valves for 40 additional presses are already installed.

Injection molding of thermoplastics will constitute an increasing schedule of production in the new plant and while there were but two injection presses installed when the writer visited this department, two more were on the way and will probably be in production before this reaches print. Experimental work is under way with some of the newer transparent plastics including ethylcellulose and methylmethacrylate and it is expected that both these materials will be added to the rapidly expanding demand for cellulose acetate and other materials capable of molding by this rapid method. Injection presses are, of course, self-contained needing only an electric connection and an air line for their operation. There is ample space provided for expansion in this department so that twenty or more presses can be installed without crowding.

Three preformers (Fig. 13) are operating at present in an open room awaiting their individual housings which will keep different colors separate and clean. Fig. 14 shows a corner of the maintenance room for repairing and altering molds and dies where new modern equipment provides every facility for this important work



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Power plant

The power plant, which is 48 feet wide by 64 feet long, has a ceiling 29 feet high—10 feet brick, then 19 feet all glass to the top. It is light, cheerful and easy to ventilate.

The 250-H.P., 150-pound working pressure boiler, it is claimed, has more heating surface than any other boiler available in its type, making it more efficient. It is fired by the latest development in stoker-firing which burns fuel partly in suspension, partly on grates. By this method, cheaper grades of coal can be used to give the same efficiency as would be obtained by hand-firing with more costly coal. The stoker is entirely automatic and is so controlled that steam pressure is held within a range of five pounds plus or minus and can be set so that it is within two pounds (*Please turn the next page*)

15

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17

Finishing room equipment consists of highspeed lathes and drills on which Bonnyware molded dishes and other parts are stripped of flash, drilled and polished (Figs. 15–16) but difficult corners as in all shops are reached by hand (Fig. 17). Tumbling barrels are also used in the finishing operations

of the blow-off valve, reaching a maximum pressure before the safety valve automatically releases.

For heating purposes, a reducing valve lowers steam pressure to 25 pounds for feeding individual unit heaters placed on central columns the length of the building. Each heater is equipped with a fan to regulate the amount of heat desired, and with deflectors to guide its direction for greater comfort of those nearby.

The molding plant operates on a two-pressure system, high and low. The high pressure horizontal pump is capable of delivering 60 gallons per minute at 3000 pounds pressure. The low pressure pump, which is also horizontal and motor driven, will deliver up to 65 gallons per minute on 500 pounds pressure. These pumps are of the same design as those used at the Jackson plant during the past five years with practically no maintenance cost.

Accumulators are of the air ballast type and are quite like huge air-bottles of steel. Pressures can be varied at will and the accumulators are fully automatic, controlled by regulating valves so they cannot overload. Water can only be drawn down to a certain level before the pump is automatically cut in again to maintain pressure. These accumulators require less space than weight-loaded units and require no special foundation for installation.

Both high and low pressure accumulators are equipped with safety closing valves. In the event of a sudden withdrawal of liquid, or a broken pipe line, this valve will close immediately, cutting off the accumulator. In case of failure of electric motors or a break in the electrical circuit, these valves automatically close and cannot be opened until the circuit is restored.

The high pressure pumping unit is controlled by an automatic by-pass valve and a pressure range. When the accumulator pressure reaches 3000 pounds the pump is by-passed at a very low pressure. The low pressure pumping unit is cut in and out as the pressure range varies. The control is so arranged that at no time does the pressure drop in either accumulator exceed 10 percent.

In the power room there are also two air compressors to supply the air lines; in fact, everything is installed in duplicate except the boiler and the high and low pressure pumps which are individual units. Space, however, has been provided for a duplicate boiler right beside the present installation when conditions require it.

Because of the quantity of water required, there being no free and natural source of supply, a water reclaim and cooling system has been installed whereby practically all water can be reclaimed from the presses and cooled. The water used is treated and softened to eliminate impurities and scale in order to protect the lining of the boiler, molds and the entire system. The only new water used is whatever small amount is lost in evaporation or small leaks around the press room and that lost during the changing of molds. The system is designed to handle 175,000 cubic feet of water in a 24-hour day. Water is carried through return lines to a receiving tank and is then pumped up to a cooling tower on the roof in showers, or sprays, where air current cools it to a certain temperature. This temperature, of course, is not equal to that of water coming in from city mains but it is cooled sufficiently to operate with efficiency and thousands of gallons of water a day are saved. City water is used, of course, for drinking and other sanitary purposes.

(*Please turn the next page*)

CHARLES G. MUNN, PRESIDENT

JOHN G. ROSSITER, SALES MANAGER

Maintenance shop

For the time being, molds, or tools and dies will continue to be made in the Jackson plant. The maintenance shop at the Cambridge plant, however, is located at the lightest end of the building and is being equipped with machinery of the latest type which is placed to take greatest advantage of natural daytime lighting. Lathes, shapers, drill presses, milling machines and duplicators are arranged so that the greatest amount of light will be thrown upon the work itself and when the operator is at the machine, his back will be toward the light. For night work, each machine is properly lighted with a flexible lamp.

Artificial lighting

This brings us to one of the most interesting industrial lighting installations we have ever seen, one of the newest and most practical as well. It embraces a trolley duct system of wiring for all general lighting in the plant which consists of an overhead track containing fully insulated, 50 ampere copper bus bars with movable current-collecting trolleys to which luminaires are attached. The trolleys are inserted in the duct runs and can be moved to provide light where and when it is needed.

There are five 350 foot runs of the trolley duct installed in the plant proper. One is placed between the outer wall and the first row of concrete columns; another between the first and second rows of columns. Three are evenly spaced in the 28 foot unobstructed area that extends through the plant. Twenty 200-watt reflectors are wired and attached to trolleys in each run and each luminaire is individually switched and fused.

The second floor has four 300 foot runs of duct installed. Two 90 foot runs with eight luminaires each are in the pilling room, and the maintenance shop is equipped with four 107 foot runs providing about 40 movable lights. The ducts are mounted against the concrete ceiling with special hangers.

Beyond the obvious advantage of having plenty of additional light available anywhere it is required, there is the opportunity for rearrangement of equipment for expansion without being hampered by fixed outlets which would entail expense and delay to rearrange to conform with a new plan.

Another feature of this system is the continuous outlet extending along one side of the duct sections. Additional lights can be inserted in the duct run and moved to occupy whatever position is desired. Portable power tools can be used anywhere in the plant by merely plugging into any available duct run with twist-out plugs.

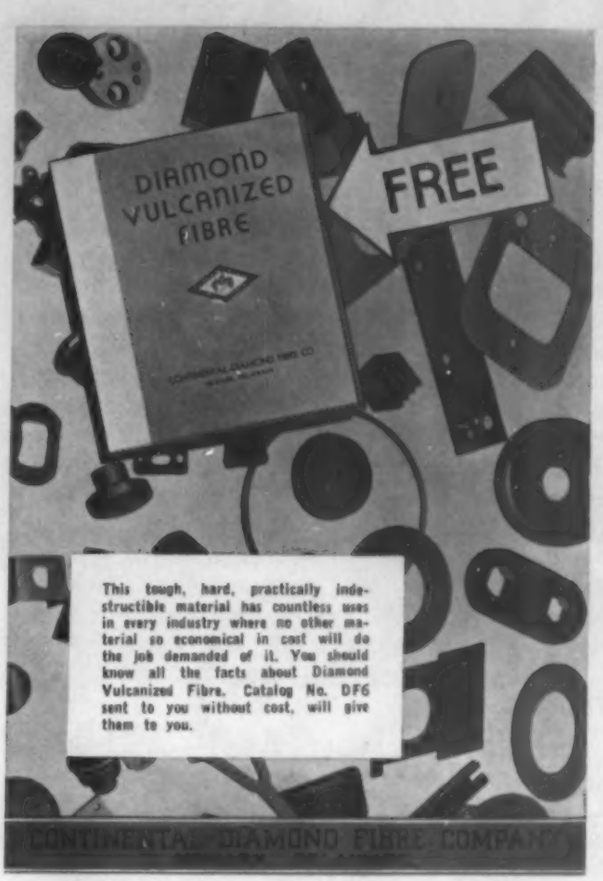
Electrical power

The electrical power installation (everything is electrically driven) is equally well planned, not only to take care of present needs, but with adequate provisions for future growth and development of plant services. Distribution systems are flexible and salvable to meet changing conditions at the lowest possible cost. No matter what changes may be brought about in production equipment, this plant is fitted to handle all electrical demands quickly and economically.

A single section totally enclosed free-standing dead front switchboard is fed from a bank of transformers located just outside the power house. The company, by the way, owns these transformers and is therefore able to buy electrical current at a considerable saving. Two self-contained switch units are incorporated in the board—a 400 ampere, 3 pole switch and a 600 ampere, 3 pole switch. Space is allowed for two additional circuits in the future. To carry the idea of flexibility a bit further, the switch units are interchangeable for all capacities, voltages and number of poles.

A modern bus distribution system supplies power to molding presses and machines. The bus-way method of wiring is a comparatively recent development which permits rapid yet permanent and safe connections for power. A machine can be plugged in as easily and quickly as can an electric iron or toaster at home. It offers flexibility in the relocation of presses and motors.

This system consists essentially of copper bus bars mounted on vitreous insulators and the whole is totally enclosed in steel duct. Provision is made in the duct for attaching special plugs through conveniently placed



knock-outs. These plug-in devices carry fuses, vacuum-break switches and circuit breakers for branch circuit control. From these plugs wires are carried in short lengths of flexible or rigid conduit to loads.

Pilling room

The pilling room is not completed and looks much like any other pilling room at the present time. Plans, however, call for air-conditioned storage rooms where molding compounds will be kept in individual compartments in which the temperature and humidity will be controlled. Brick partitions already installed indicate where these rooms are to be located. A dust-collection system, which is claimed to remove 99½ percent of the dust, will be installed and each pilling machine will be enclosed in a conical shaped hood which can be easily cleaned when changing from one color to another. Since much of the molding at this plant will be of urea and cellulose acetate compounds, every precaution will be taken to keep the materials clean and the colors separated from one another both in pilling and molding.

Finishing

The finishing room will be located eventually on the second floor but for the time being it occupies the space back of, and adjacent to, the line of presses already installed. The benches are arranged so they can be moved into various positions to accommodate flexible production. These benches are equipped with high-speed drill presses, horizontal belt sanders, vertical belt sanders, simple planing lathes and specially designed machinery for special operations of cleaning and finishing the molded parts. Each bench may be interchanged with any other bench in order to step up finishing operations when necessary, and all wiring has been installed so that it can be quickly disconnected and reconnected without loss of time.

As the work progresses through the finishing department it approaches the packing and shipping department where it can be loaded directly onto trucks or cars according to its destination. Provision has been made to bring the finished parts to the shipping department on continuous conveyors when the finishing department is finally located on the second floor.

Hundreds of thousands of pieces of Bonnyware, a line of urea molded tableware which this company makes for the chain store trade, is stored on the second floor. Items of different colors are stacked in individual bins for easy selection in filling orders each day.

The company, however, is not limited in its production, either to stock items or automotive moldings, but supplies molded items of almost every description to a wide range of industrial plants. Knobs, handles, telephones, radio cases, refrigerator parts, boxes, electrical parts, camera cases, cigaret cases, kitchen utensils, premium items, coat hangers, fish lures, radio parts, household hardware, door-knobs, escutcheons, are but a few of its diversified lines. Its most recent product is the housing for the new Toledo Guardian Scale.

CASA MANANA

(*Continued from page 32*) vivid background for the show. The lighting effects achieved are particularly effective as the dancers move across the stage.

The Casa Manana costumers, also, have made liberal use of plastics in their quest for out-of-the-ordinary. One chorus is outfitted with hats featuring a long plastic

The costume of the show girl is also a chemical creation—Cellophane skirt, cuffs and wide ruffle about the neck and a fan-like hat of Plastacele. (Photo courtesy du Pont)

mortar board, plastic shoulder pieces and gauntlets, all transparent. In another, show girls appear with high plastic headpieces, setting off the chemical character of their garb which begins with long trailing skirts made of cellulose film. The show is one of the most spectacular ever put on in a New York night club, and has aroused nation-wide attention.

REALWOOD — LAMINATED PLASTIC

(*Continued from page 31*) work. When it was discovered that a laminated version of exactly the same wood could be had to tie in perfectly with other fixtures, they went a step further and specified it for every location where its lasting qualities and superior finish would prove advantageous.

Seven-foot panels of laminated Prima Vera, inlaid with horizontal strips of American Walnut and Red Mahogany protect the lower portion of the walls on each of the three sales floors; the same combination of laminated serves as side covering for escalators operating between the first and second floors; the sides of stairways, one at the front of the store connecting the first and second floors, and the other at the rear leading down into the basement, are similarly treated with the addition of a wide border of blue laminated material. Carved mirrors

CLASSIFIED

➡ **WANTED IMMEDIATELY: Large Molding Presses, Multiple Ram Presses, Extruders, Injection Presses, Hydraulic Pumps, Hydro-Pneumatic Accumulators, Preform Machines, Pebble Mills, Mixers, Sifters, etc. WILL PAY CASH. We carry large stocks of Plastics and Hydraulic Equipment. Send us your inquiries. Reply Box 220, Modern Plastics.**

●

➡ **FOR SALE: Hydraulic Presses, Extruders, Injection Presses, Pumps, Accumulators, Preform Machines, Rolls, Mixers, Sifters, etc. Send for complete list. WANTED: Large single punch and rotary Preform Machines, also a Hydro-Pneumatic Accumulator. Reply Box 223, Modern Plastics.**

●

➡ **MANUFACTURER'S AGENT with established industrial accounts in Wisconsin; good knowledge of plastic molding; desires to represent molder or manufacturer. Reply Box 224, Modern Plastics.**

●

➡ **WE WISH TO SELL one five and one ten horsepower Mears-Kane-Ofeldt Gas Steam Boiler. Both fully equipped and with pumps. Only nine months in use. Reply Box 225, Modern Plastics.**

●

➡ **CHEM. ENG. Thorough knowledge mfg. cellulose acetate plastics. Kneading (mixing) coloring, converting (hot rolling) grinding. Experienced color-matcher, knows inj. molding. Princeton grad. Desires connection in plastic plant; production, sales service or any other capacity. Reply Box 226, Modern Plastics.**

on the wall side of the front stairway are framed with laminated pilasters inlaid with wide strips of American Walnut edged with narrow strips of Red Mahogany. All window valances are of the plastic material inlaid with metal, part of the design forming a frame for a red metal "W," the Woolworth insignia.

Front panels on two lunch counters, one in the basement and the other on the second floor, are of laminated Prima Vera, eliminating any possibility of scuffing or damage from feet and knees rubbing against them. A two-foot seven-inch space in the backboard of the counters is covered with blue laminated material inlaid with murals in light and dark gray, red, light green, silver and copper, depicting scenes of interest in New York City, such as the George Washington Bridge, Public Library, Times Square, Radio City, Grant's Tomb, Metropolitan Museum, Rockefeller Church, etc.

Baseboards throughout the store are laminated to simulate black marble while stairway handrails and other trim are fashioned from stainless steel. The entire arrangement of color and material, the modern overhead lighting fixtures and placement of merchandise counters, produces a cheerful, convenient aspect conducive to comfortable and enjoyable shopping.

The F. W. Woolworth Co.'s use of this newest of laminated plastics, Realwood, suggests an infinite variety of architectural applications. The ease with which it can be installed and the beauty of the wood with its permanent plastic finish that perseveres through the roughest kind of treatment, recommend its use wherever these characteristics are desirable. And its cost compares favorably with that of actual wood when sanding, varnishing and finishing operations are considered.

MOLDS FOR PHENOL RESINOIDS

(*Continued from page 52*) this marking should be carried on a removable plug of a minimum length of not less than three times the diameter.

(c) Serial number of the cavity.

Chase

The chase, as previously explained, is the main or central body of the mold, which contains the molding cavity or cavities. The selection of the proper steel for the chase of unit construction molds and the cavity plugs, followers, etc., of built-up construction molds, of necessity, should be given the most careful consideration in order that the cavities will produce pieces of extremely close tolerances. No appreciable wear or change in shape under the effect of heat or pressure can be permitted. Opinion differs as to the best type of steel to be used for the application. Some mold manufacturers advocate the use of a high grade, high carbon, oil hardening tool steel, while others believe that equally good results are obtained with a mild pack-hardened, low carbon, machining steel. The comparative advantages and disadvantages of these classes of steels, disregarding specific instances to the contrary, are as follows:

	Advantages	*Disadvantages*
Tool Steel	Minimum distortion in heat treating. Minimum distortion under molding pressure. Long life.	Difficult to machine, not suitable for hobbing. High cost.
	Advantages.	*Disadvantages.*
Machine Steel	Easy to machine. Readily hobbed. Low cost.	Must be pack hardened. Liable to distort under heat treatment. Hard surface over soft core with tendency to crack under use.

After a study of the foregoing, there is little doubt as to the superiority of tool steel, for general usage for manufacture of the chase and die and, unless hobbing is absolutely essential, tool steel should be required, hardened to Rockwell 65 or Scleroscope 75-80.

The forming of the cavity within the chase of unit constructor molds by hobbing is done extensively and, of course, is advocated by manufacturers as an economical measure. It is believed that the application of this method of manufacture should be carefully scrutinized before approval as the hobbing method entails the use of a special hobbing steel which is not equal to tool steel as applied to the cavity parts of the mold.

For built-up construction molds wherein the cavities are found by the use of cavity plugs, etc., the chase should be of the best quality of machine steel, pack hardened.

As a result of the experiences encountered in the purchase of molds for Navy Standard pieces, and their subsequent operation, it has been found to be highly desirable to require some uniformity in mold construction for the same type of molds. For the chase of single cavity molds certain limiting features are being established which will prove of value in stabilizing designs. These are: The chase should be of rectangular shape.

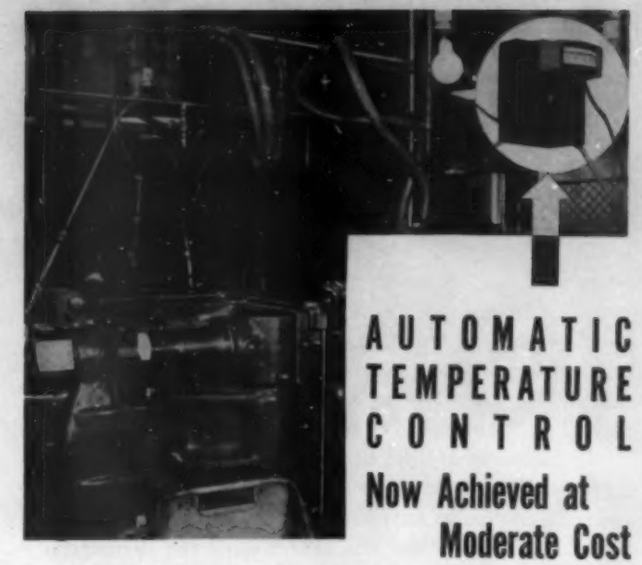
For molds where the molded piece is greater than 1 in. (length or diameter) and does not exceed 5 in., the minimum thickness of wall of the chase will be 1 inch.

For pieces whose length or width is above 5 inches, to a maximum of 8 inches, the minimum thickness of the wall of chase should be 1 1/2 inches; and above 8 inches, the wall thickness should be 2 inches. For molded piece below 1 inch the thickness of the wall of chase should be as approved for the particular case.

The minimum wall thickness in way of guide pins should be 1/2 inch.

The thickness of metal between cavities for multiple cavity molds should be a minimum of 3/4 inch.

Holes bored in the chase to accommodate guide pins and knockout pins should be carefully positioned so as not to weaken the chase against lateral strains during the molding operation. (*To be concluded in May.*)



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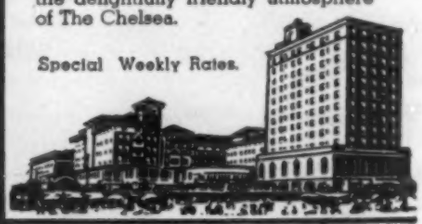

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EIGHT MOLDED PARTS

(*Continued from page 35*) obvious limits; but the net result of this new scale job is definitely to open up the whole field of housings and covers. It removes that habit of thinking which automatically approached every potential molding job as a one-piece problem.

Secondly, we again have an emphatic demonstration of the extent to which redesign, using plastics, can overhaul and improve a product in unsuspected ways. Consider some of the differences between this scale and its older models of heavier, more conventional materials.

The older model weighed 147 1/2 pounds, and was not subject to demonstration in the prospect's shop. The new model, which is called the Toledo Guardian, weighs 56 1/2 pounds—easily carried into a shop by one salesman. It is incomparably more compact—which means much to the merchant. In height, its 20 1/2 inches are 6 inches less than its predecessor—which means six inches *not* hiding displays. It occupies 40 square inches less space than any comparable type. From front to back, it is the shortest scale of this kind, and it has the shortest overall width. It is not merely the same old weighing mechanism in smaller space; it is newly engineered in vital respects. The result is a much more compact machine, fast and efficient in weighing, lighter to carry, lighter to ship, more attractive to the prospective buyer's critical eye.

Mention of shipping should include the fact that the new scale, packed for freight handling, weighs 100 pounds. The older model weighs 205. Therefore, every shipment of the new scale, saves freight costs on 105 pounds.

A curiously interesting feature of the Guardian Scale is the fact that its legs have optional positions. This simple improvement is of great importance to the merchant, who often has trouble locating a scale in certain counter positions because of the rigid location of the legs. The legs on this scale can be shifted to any one of seven different positions, which makes it possible to place the scale in locations not hitherto available. This could have been done for older models, but no one thought of it until use of plastics compelled a fresh, original analysis.

Harold Van Doren says about this latest of his new designs: "The new Toledo Guardian scale is perhaps one of the largest mechanisms to date completely enclosed in a synthetic plastic material. Its design, however, is newsworthy chiefly because no attempt was made to devise a one-piece housing or even one made of two equal halves. This proved to be impossible due to the many limitations imposed by the mechanism. Instead the housing is composed of eight separate moldings secured to a frame or chassis. In some instances it was possible to conceal the fastenings entirely, as in the case of the lever housing under the platter and the semi-cylindrical chart covers. At other points, however, it became necessary to use external fastenings, in this case gullmite screws, so that the banjo-shaped end plates could be easily removed and serviced for adjustment.

"These end plates assumed their particular shape partly for the sake of appearance and partly to reinforce the piece against possible warpage. The front and back cover plates, which are simply flat sheets, have been designed with embossed panels for the same reason.

"The general theme of the design, with its chamferred edges and squarish, clean-cut lines was adapted from the Toledo Sentinel scale, the plastic one-piece housing which we designed two years ago. This treatment was originally adopted with the definite purpose of distinguishing this gleaming white plastic from other materials such as sheet metal with porcelain enamel or synthetic finishes. Porcelain enamel had required soft radii in the metal to avoid chipping and the material used is as dissimilar in character as possible.

"It is worthy of note that although the scale requires eight molded parts, only seven molds were necessary, since the end plates are identical. Although the revolving chart inside is not concentric with the cylindrical housing, it was thought advisable to make this compromise in order to save in mold expense."

CANDID, INDEED

(*Continued from page 44*) lens is reported to be extremely fast and sharp providing negatives that will stand enormous enlargement. The lens is fully color corrected and has a circle of confusion of 1/2000 on axis. It is equipped with a front operated iris diaphragm. The entire objective system moves as a whole in a helical mount and focuses from infinity to 3 1/2 feet. Spacer tubes for lengthening focus will be available for copying and close-up work. With the latest ultra speed film this 3.5 lens is adequate for every occasion without the loss of definition often apparent in larger aperture lenses.

The lens is quickly interchangeable and a series of different type lenses are to be available as additional equipment. The lens front mount is threaded to accommodate a new series of filters which screw into place. A new enlarger will also be available on which the standard *f*3.5 lens is used.

The micromatic shutter is of entirely new design and construction. It has a range of ten speeds from 1/5 second to 1/200 of a second including "bulb." One-fifth of a second is the slowest speed which is practical for making exposures with camera held in hands. Other slower speeds are obtained for tripod or rest position by "bulb" setting. The shutter is of very rugged construction with few moving parts and a simplicity that insures dependable operation. It is located directly behind the lens and permits the advantage of interchangeable lenses. The location and operation is similar to the professional type movie camera. Its wide range and simplicity of operations will be welcomed by the most exacting camera fans. The controls for focusing, range finding and shutter operations are placed at the finger tips when holding the camera in a normal position.

The Argus Model "C" was designed and produced to fulfill a long felt need for a versatile camera suitable for

every type of photography from laboratory research to the candid amateur. It will be welcomed by travelers, doctors, dentists, scientists, industrialists, news reporters, advanced amateurs and camera fans, engaged in all types of work. The molded plastic case makes its contribution both to appearance and to the low price at which this camera will sell.

PERMANENCE OF PLASTICS

(*Continued from page 49*) ishes on steel which usually take place in six to eight months on a stationary rack have been well developed on the rotating rack in six to eight weeks.

Some information on the effect of light upon various transparent plastics has been obtained at the National Bureau of Standards[5] during an investigation of airplane windshield materials. Fig. 1 shows specimens of ethylcellulose (10, 11), cellulose acetate (12, 13, 14), and methyl methacrylate resins (15, 16, 17, 18) which were exposed out-of-doors in Washington for six months from June 12 to December 12. The lower portions of the specimens were covered with a metal plate fastened about 1/4 inch away from the plastic. In this way the only difference in the exposure conditions for the two parts of the samples was the access of light rays to them. The ethylcellulose samples had become opaque and friable in the unprotected area. This portion of one of the samples (10) had broken away from the covered material. Samples 12 and 14 indicate the susceptibility of celiulose acetate sheet to deterioration by sunlight unless suitable precautions are taken in formulating this material to guard against such sensitivity. Sample 13 represents a cellulose acetate composition developed by the manufacturer after our tests had demonstrated the impermanence of the above products. The improvement in light resistance is readily apparent. Samples 15 to 18 are methyl methacrylate resins. This type of plastic has been found to be remarkably stable to light in tests extending over two years. A slight yellowing can be observed upon close inspection of the edges of the samples, but it is not sufficient to be discernible in looking through the specimens.

The condition of plastics exposed in curved frames for eight months is shown in Fig. 2. Fig. 3 shows two exposed samples of cellulose acetobutyrate. The specimen (1) which is badly deteriorated in the unprotected portion had been on the roof only three months beginning September 21. The specimen in the frame (2) did not have a covering over any part of it, but it has apparently been unaffected by 20 months' exposure on the roof beginning March 6, 1936. The bubbles were originally in the sample and were caused by too rapid evaporation of solvent during casting. These tests emphasize the need for stabilization and proper formulation of plastics if they are to be resistant to sunlight.

[5] B. M. Axilrod and G. M. Kline, "A Study of Transparent Plastics for Use on Aircraft", J. Research NBS 19, 367–400 (Oct. 1937)
[6] American Tentative Standard Z 26.1—1935, Safety Code for Safety Glass for Glazing Motor Vehicles Operating on Land Highways.

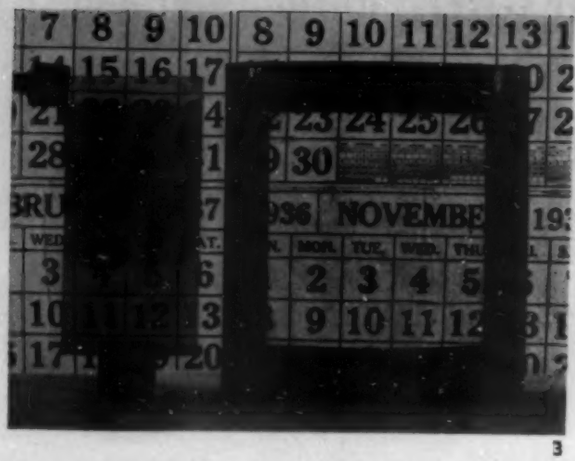

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FIGURE 3.—EXPOSURE TESTS OF CELLULOSE ACETOBUTYRATE PLASTICS

Identification number	Sample	Length of exposure months
1	AA1	3
2	S1	20

A number of accelerated aging tests to determine the effect of ultraviolet light generated by carbon or mercury arcs on organic materials have been proposed. This method of testing paint and varnish films was the subject of a symposium at the 1937 annual meeting in New York. It was the consensus of opinion that although these tests were useful in detecting materials of poor stability, they had not yet reached a point where they could be relied upon to give results comparable to those of fence or exposure rack tests.

In general the carbon arc has been found by plastics laboratories to give results more nearly comparable to actual exposure than does the mercury arc. However, one particular instance of standardization upon the quartz mercury arc lamp for testing a plastic is the specification of the American Standards Association[6] for laminated glass. It provides that the specimen shall be exposed for one hundred hours at a distance of nine inches from a source of ultraviolet radiation equivalent to that of a "Uviarc Test Cabinet" or "Laboratory Outfit" of the 220-volt Cooper Hewitt type, with the lamp operated with 170 volts across the tube and with a current of 4 amperes. The irradiated samples must transmit not less than 70 percent of the light from a source having a color temperature of approximately 2900 K., such as a new 200-watt gas-filled tungsten lamp operating at rated voltage. The development of defects other than a slight discoloration noticeable only when the samples are placed on a white background, is indicative of failure.

Figures illustrating the condition of various plastics after exposure to carbon-arc light for 500 hours together with tables showing their reaction to heat, water and chemical reagents will follow in the conclusion of this article by Dr. Kline in our May (1938) issue.